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(Turn to page 27)

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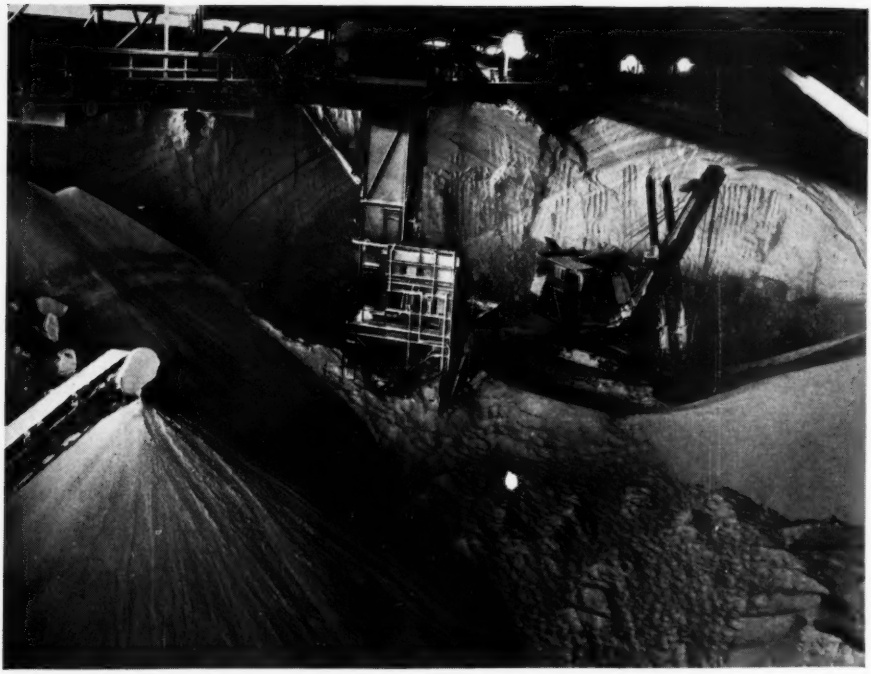

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THE AMERICAN POTASH INSTITUTE

1102 Sixteenth St., N. W. **Washington 6, D. C.**

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

Editorial Office: 1102 16th Street, N. W., Washington 6, D. C.

VOLUME XXXVII NO. 7

TABLE OF CONTENTS, AUGUST-SEPTEMBER 1953

Little Things 3

Jeff Recalls Some Small Incidents in Our Lives

Potash Pays With Peanuts 6

F. H. Jeter Reports an Experience with Fertilizing This Crop

Rothamsted Revisited 9

G. J. Callister Brings Us up to Date on a Famous Experiment Station

Planting for Dry Spells 13

J. Olan Cooper Suggests Ways of Lessening Drought Damage

Strong Roots Make High Corn Yields 17

H. J. Snider Discusses the Effects of Root Growth on Crop Yields

Recent Trials With Rescue Grass 20

B. H. Hendrickson Describes Recent Work with an Old Crop

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While The Livestock Eats!

Better Crops with PLANT FOOD

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VOL. XXXVII WASHINGTON, D. C., AUGUST-SEPTEMBER 1953 No. 7

We remember . . .

Little Things

Jeff McDermid

LITTLE and sometimes insignificant things play a larger part in our lives than most of us are willing or able to see. It's not intended to enlarge upon this theory by copying some treatise on the potency of the atom or the stupendous power for good or evil which lies within the right combinations of catalogued protons and neutrons. This is hardly necessary since we are used to cowering in the black shadows of devastation and hearing the promises of self-renewed power engendered by all this revolutionary physical research.

Anyone who has a memory for strategic incidents in his own humble experience realizes at once that man's ultimate destiny and his life's happiness may hang on a chance meeting or a little conversation, in which he played a passive role. I know a fellow who went seeking a paying job in a distant city. He went to the institution most apt to employ him and such meager talents as he then possessed. He was told to return in a month and see the man again. But meantime he crossed the street and asked another foreman in the same trade what the chances were for employment. Here he made a definite appointment to begin his duties so that if he returned in a month he could begin work.

On that day he returned with purpose set to hire out to the second foreman. He ate a frugal lunch and started to walk across the square to sign in for duty. Midway to the appointed shop he chanced to meet the first boss, to whom he had presented his credentials and asked for work the first time. This man thereupon gave him the opportu-

nity he longed for most, under better circumstances more likely to gain promotion. So he notified the other shop that he was unable to accept and the next day he donned his work suit and tackled the job with the alacrity and eagerness of youth.

The nub of the matter is that in this shop of his accidental choice he came to know and regard with growing tenderness a fine young woman employed on its staff. Had he hidden his "good looks and charming voice" in the routine behind the curtain of the rival shop there is small chance that these two, who later spent their married life together, would have ever met or got to know each other's strength and weakness and learned to share parental cares with more than fair success.

THUS on this little thing of a chance meeting at a certain spot between a foreman and a job-seeker were set in motion forces that only a belief in destiny can explain. Had either one been a few minutes later reaching that junction of their different ways, the future for at least two lives—and maybe the make-up of several more—would not have come true. And the woods are full of many such stray events that have shaped far greater results.

Men have met in casual conversational interludes, and some spark of an idea or a conjecture has inspired a train of thought to awaken and guide its possessor to new and unusual fields of production or processing. Whole new industries given to the world have come to pass merely with a breath, a sharp but imperfect vision, leading to a sure and confident conclusion.

Laboratory workers and scientific devotees by the hundreds testify to the wonders of achievement that have resulted from pure accident, a formula gone wrong, an unforeseen quirk in procedures, or the refusal of a process to behave as it was expected to do. So working almost backwards and hindside-to they delved into the puzzle before them and came up with new marvels for man to do.

In this same way we see that little things can really become big things. Our careers and our accomplishments are often not the fruit of preparations we have made or paths that we chose to follow. In some unexplained and mystic way we find ourselves far from being the masters of our fate in the accepted Horatio Alger style.

It's not always the nicest picture, either, this contemplation of how much we can lay credit or blame for what transpires upon little things of no apparent moment. We get sicknesses that way, and wrong opinions of men and events, and hatred or suspicion, or lack of confidence in ourselves and others, just from insufficient facts or understanding. Measly trifles, floating gossamer of prejudices, small irritations and upsets, passing periods of stubbornness—these are the tiny, temporary waves that intrude in a negative way to influence us.

I HAVE also listened avidly to some passing gossip or belittling inferences about persons or methods or meanings, both public and private in nature. Sooner or later an occasion arose when I had to decide which course to take or which things to believe. Not having personally certified to the facts or verified the rumors, it proved easy to draw false conclusions and join witless alliances to lend my influence and example in the wrong direction.

I am also aware that timing of events uncontrolled by the actors therein often turns such events into serious accidents that ruin lives and hopes for innocent bystanders or travelers. All the seamy side of the impacts of little things and the small turns of fateful circumstances on humanity are too well accepted to be dwelt upon here.

Fully cognizant of this, let's omit further mention of the luck that we call "bad luck" and the small pains that go on and then grow into mortal ailments. The other side of the question is more sustaining and more conducive of thoughts to help our welfare

and stability. Let us rather seek what we are after along the high road, many of whose pleasant miles we were permitted to tread musing upon the trifles that make human life bearable and memorable.

A little insight of this nature came to me from a friend. When he was first married, he and his new wife had little current means. When the baby came they shopped around and found a second-hand baby carriage that a few coats of varnish and some careful sew-

ing of battered upholstery made into almost new again. Oh yes, he also said that one wheel wobbled crazily before he fixed it. He recalls thereafter how on every working day when the weather was nice he "dated" his wife on a pleasant tree-lined street that lay on his way to work.

That date consisted of meeting her regularly and they would push the baby buggy with its sleeping occupant back toward home, serenely happy in a humble way. Maybe they would stop at the old familiar drugstore on the corner for a couple of ice cream cones or, on a flush payday, for two dishes of her favorite treat—a chocolate nut sundae, costing 20 cents apiece. The "little thing" reposing in the makeshift vehicle has since grown into a fine young woman, he says, while the whole incident of their frequent meetings has grown from a little thing of slight consequence into a treasured memory which all the sands of time can never cover or obliterate.

Another friend tells me of a lonely boy on a back street without playfellows, who used to stand outside the door and watch for a generous old neighbor across the way. This grand old party remembered through his long years that little boys like some attention and maybe a tasty tidbit sometimes. So he would come out and stand with his white hair blowing in the breeze, and beckon to the kid to come on over. When he got there the aged neighbor would have a small plate of doughnuts, and he'd ask the youngster to sit down on the big carriage block and eat those golden "riz" friedcakes.

To make the occasion more memorable, the old man always claimed to the boy that he had to swipe those baked goods on the sly from Mother's fresh batch. In truth, Mother sent him out to offer them. But there was more zest in forbidden fruit—as the old man himself knew from personal experience in watermelon patches as a lad. Long years of richer foods and bigger banquets have not erased the fondness this man still possesses for those crusty New England treats.

STILL another little thing looms big in the memory of a girl who spent her savings for a dime-store present for her Mother on Mother's Day. The gift was just one of those Japanese imitations of a cute piece of Dresden chinaware. It was molded in the form of a young woman dressed in the style of the Regency, with square extended hip effect and an upright hair-do. The top half came off and the inside space was handy for hairpins, rings, and other dressing-table odds and ends. After her Mother passed away the woman that used to be that little girl took that item as her first choice of the remaining effects. The sassy little figurine stands on her own dresser among the most costly nicknacks that have come her way in the course of twenty years. Clinging to material objects may be futile in a long span of time, but to many sentimental folks it packs the best we have left in spirituality.

Remember the little stories your parents told, like the fun they had with kids in school and certain unforgettable

(*Turn to page* 43)

Potash Pays With Peanuts

By T. H. Jeter

North Carolina State College, Raleigh, North Carolina

ONCE a fellow gets a taste of peanuts, he continues to eat them regardless of the length of his girth, the present state of his avoirdupois, and the advice of his doctor. Peanuts act the same way about potash. This is especially true on eastern North Carolina's sandy loam soil where the crop thrives and where the farming people hold it in such high regard. Let's consider the experience of George P. Kittrell of Corapeake, Gates County. Last year, 1952, Mr. Kittrell produced 2,764 bags of peanuts averaging 88 pounds to the bag on 94 acres.

But he didn't always do so well. A few years before he was making only 12 to 14 bags per acre. As the above totals show, he produced 29.4 bags per acre over his whole acreage in 1952. Mr. Kittrell says the best way to indicate what happened is to give the yields of one 11-acre field on which he kept accurate, year by year records. He bought the 11-acre field in 1934 and planted it in peanuts that year. He picked 168 bags from the 11 acres. It is the Kittrell plan to put the land into peanuts every second year, so in two-year jumps here's how the record reads since then: 1936, 198 bags; 1938, 202 bags; 1940, 209 bags; 1942, 214 bags; 1944, 224 bags; 1946, 239 bags; 1948, 259 bags; 1950, 247 bags; and 1952, 351 bags. This shows a slight relapse in 1950 due to very unfavorable weather conditions.

Mr. Kittrell's acre yields began to increase as soon as "we began to use potash as a sidedressing, and commercial fertilizer with a 12% potash content." This 11-acre field has been covered with manure several times and has been limed. The owner also produced 90 bushels of corn per acre on the field during the interim year of 1951, using the US 578 hybrid. In 1952, he produced an average of 33 bags of peanuts per acre on the field. That's double the yield secured when he first began to keep the records per acre.

Another good feature of this work by this Gates County farmer is that he adopted a rotation of crops using corn or cotton with his peanuts. The entire acreage is covered over with a winter grazing or hay crop and 150 pounds of potash per acre are used when the peanuts are planted. J. P. Woodward, Extension Specialist in Peanut Production, says Mr. Kittrell continues to look for ways in which to increase his peanut yield. This year, 1953, he is one of the chosen few selected to increase the new NC 1 and NC 2 peanut varieties released by the North Carolina Experiment Station.

What Mr. Kittrell is doing in Gates is receiving similar attention in Halifax County with equally as good results. Two or three years ago, Halifax peanut growers became alarmed at the steadily decreasing acre yields of this money crop. They decided to do something about it and began to study the fields that produced 20 to 25 bags of nuts per acre, in comparison with those that made only 10 to 12 bags. As a result, they began a regular peanut improvement campaign. This program has been under way for two years now and calls for careful planning. First, the growers have agreed that they must grow the peanut crop in rotation and they have adopted one that runs like this: Cotton the first year; corn the

Fig. 1. North Carolina's three great crops—peanuts in center and left, tobacco at right, and corn in background—Pitt County, N. C. (Photo by Ralph Mills.)

second year; peanuts the third year followed by small grain and this small grain by lespedeza or soybeans after the small grain has been combined in June. W. O. Davis, Halifax Farm Agent, says the growers have learned that peanuts produce better following corn than they do when following cot-

Fig. 2. The peanut "picker" at work. The vines are saved for winter roughage and bedding. (Photo by Ralph Mills.)

Fig. 3. Peanuts "picked" and bagged. From the looks of the bulging bags, it is evident that these peanuts were well fed on potash. (Photo by Ralph Mills.)

ton. The growers also will not follow the peanuts after soybeans or lespedeza because these seem to further the prevalence of Southern stem rot and nematodes.

Halifax peanut growers believe in soil tests because the crop feeds heavily upon lime, calcium, and potash and a soil test is about the only way to find out if the soil needs these materials and how much. Soils can be overlimed even for peanuts. The Halifax growers emphasize that peanuts have an affinity for potash. They figure a crop of 20 bags of peanuts per acre will remove 60 pounds of potash from the soil and it stands to reason that if peanuts are to be grown on that farm or field year after year, some of this potash must be returned. As Mr. Davis aptly puts it, "We cannot grow potash, nor supply it in stable manure."

The Halifax Peanut Improvement Program recommends muriate of potash as the cheapest source and asserts that the best way to add this muriate is to apply extra amounts to the crop preceding the peanut crop. The next best way is to apply the muriate 20 to 30 days before planting the peanut seed. It can be broadcast at the rate of 200 to 300 pounds per acre or applied in the drill at the rate of 100 to 150 pounds per acre.

There is still another method and that's to apply from 100 to 150 pounds on top of the row after the peanuts are planted and before the seed begin to germinate. Mr. Davis says it is not wise to put this potash in the drill under the peanuts at the time of planting. This will injure the stand.

This potash pays. It helps to produce better acre yields, and since this peanut improvement program has been started, acre yields have been going up instead of down. Of course, better seed and improved varieties are helping. North Carolina is distributing seed of the NC 1 and NC 2 varieties this year to be increased and certified for more general distribution next year. Growers advise the use of 50 to 60 pounds of seed per acre and say it is wise to treat the seed with a fungicide such as Arasan before planting. Closer spacing also is helping. Halifax grow-

(*Turn to page* 42)

Rothamsted Revisited

By G. J. Callister[1]

Beamsville, Ontario, Canada

MANY readers have visited the well-known Rothamsted Experimental Station, Harpenden, England. Many more would like to do so. I considered myself fortunate in that on a return journey from Rome, I was able to follow up previous visits, first made many years ago, by a brief but most informative and enjoyable call. Knowing the great interest taken in Rothamsted by agricultural workers in the United States and Canada, perhaps a few impressions and facts of current development will be of interest, especially to those who have not visited the Station or who may be planning to do so.

Harpenden is 25 miles north of London. Train service from St. Pancras railway station is frequent. In Harpenden the laboratories are half a mile from the station. The Green Line buses from London stop at the entrance. By car, Harpenden is midway on the A6 road between St. Albans and Luton. One striking change in the scene, over prewar years, is that a large part of the Harpenden Common formerly a waste covered with gorse and blackberry is now in farm crops. England cannot afford idle land.

On arrival at Rothamsted, first and foremost is the impression of a great institution that is keeping up with the problems of the day, not only in relation to the agriculture of the United Kingdom but of the British Commonwealth. Vigor and vitality of spirit combined with research and experimental work in relation to data extending back over a hundred years make a most happy and constructive association, the basis of a contribution not only to the agriculture of the United Kingdom but in much broader spheres of activity throughout the world.

During the years since Sir John Lawes established the Experimental Station on his farm in 1843, the work has extended in many and important directions. The original home farm of 250 acres has been increased to 527 acres. The laboratories have been enlarged. The original, one-room laboratory in the barn at the top of Barnfield was replaced in 1855 by a building which was used until 1914. The present building on the same site was erected in 1914. Since then a number of additions, consisting of both new wings and buildings, have been made, and nearby houses taken over, as Red Gables, Rivers Lodge, and Rothamsted Lodge. The buildings are well-equipped and commodious and fully occupied.

Among changes that have occurred in recent years, the Woburn Experimental Station founded in 1876 and farm of 138 acres are now under the management of the Lawes' Agricultural Trust. This farm is mostly a light, sandy loam, deficient in lime, situated at Husborne Crawley near Woburn, Bedfordshire.

The Rothamsted Manor, home of the late Sir John Lawes, a spacious building of old-world architecture and oaken rooms, is situated in a beautiful garden in approximately the center of the farm. In recent years rooms in the Manor have been made available as

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living quarters for visiting scientists working on a temporary basis at Rothamsted. This is a development of perhaps greater significance than at first sight might seem to be the case. In traveling around the world, one of my chief impressions is how busy agricultural workers are becoming. Spare time is at a premium. In an age of the application of science to the difficult agricultural problems of the world, of more rapid and frequent communications and resultant increases in paper work, privacy and time for thought are becoming increasingly precious. Yet if we do not at least maintain the reservoir of knowledge and wisdom by hard and clear thinking, how will future progress be achieved?

Doubtless many workers confronted with administrative details of much responsibility would like time out occasionally to simply contemplate or to think things through. The Rothamsted Manor in its quiet setting and close association with the wealth of scientific data is an ideal place to do this.

The staff at the Station comprises the permanent scientific members, temporary workers, and the assistant and farm staff. The total is now about 400 in contrast to 12 in the 1870's. The first lady worker was employed in the laboratory in 1906. The numbers have increased substantially since then.

To give a little of the background of Rothamsted, it is of interest to note from one of the reports (2):

"In the time of Lawes and Gilbert, the work of Rothamsted covered a very wide range. Problems of animal nutrition as well as the feeding of the plant came under chemical investigation. Their analyses of the whole carcasses of animals at various stages of growth are classical, while the success with which their work on plant nutrition was carried into practice may be gauged by the rapid rise of the fertilizer industry in which England led the world. The special contributions of Rothamsted to this development, which without doubt formed one of the greatest agricultural advances of the nineteenth century, were the introduction of superphosphates and the proof of the necessity for nitrogenous fertilizers."

In the long history of Rothamsted, there have been very few changes in the directorate of the Station. After the deaths of Lawes and Gilbert, the

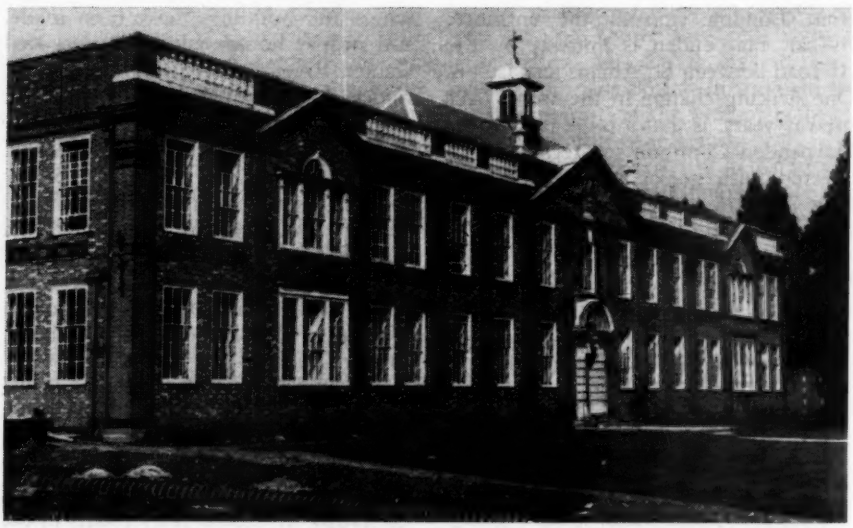


Fig. 1. Rothamsted Experimental Station, Harpenden, England.

work was continued under Sir A. D. Hall from 1902 to 1912 and Sir E. John Russell from 1912 to 1943, under whose administration the library was built up, the money raised for the purchase of the farm and Manor House, and other improvements made. Other additions have been made since that date. The present Director, Sir William Gammie Ogg, previously Director of the Macaulay Institute for Soil Research, Aberdeen, was appointed in 1943. Having visited extensively in the United States and Canada, Dr. Ogg is appreciative of the agricultural problems of North America.

Workers of an older generation will remember with great interest the First International Congress of Soil Science convened in Washington in June 1927, under the able leadership of the late Dr. J. C. Lipman, President of the First Congress, the late Dr. C. F. Marbutt, Sir John Russell, and many others. World leaders in the field of soils were there. The Congress was followed by a trans-continental excursion of 10,000 miles to examine the most typical soils of North America. The tour extended from Washington to Riverside, California, north to Vancouver, and back to Washington via Edmonton, Regina, Winnipeg, Chicago, and other places.

Among the official delegates from the United Kingdom were Professor W. G. Ogg, then from Edinburgh, and Dr. E. M. Crowther from Rothamsted, now Head of the Chemistry Department and a Deputy Director of the Station. As many of us will remember, Dr. Ogg, at that time interested particularly in soil genesis, classification, surveying, and the determination of fertilizer requirements, and Dr. Crowther, then interested in problems relating to the physical chemistry of soils, attended the Congress and were on the trans-continental tour. Their contributions to the subject matter were important factors to the success of both.

In England, different agricultural subjects are headed up each at one center. For instance, dairying is at one center, agricultural economics at another. Rothamsted is the headquarters for work on soils and plant diseases. Work now consists of fundamental researches and applied investigations into two main aspects of agriculture; one is concerned with the soil fertility, plant nutrition, and pedology, —the other with plant diseases caused by insects, fungi, and viruses. Mr. F. C. Bawden, F.R.S., Head of the Plant Pathology Division and a Deputy Director of Rothamsted, has major responsibility in the latter field. Of the total scientific staff more than half is engaged on the study of plant diseases

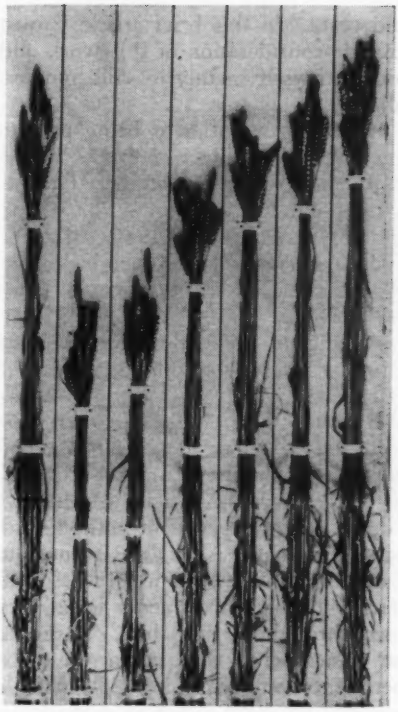


Fig. 2. Wheat grown on Broadbalk Field, Rothamsted Experimental Station; continuous wheat 1843-1925 (except 1915 fallow), then cycle of bare fallow followed by successive wheat crops; produce of 1943—the hundredth season, 95th crop; section 4 fallowed 1915, 1928, 1929, 1934, 1939; fourth crop after fallow. From left to right: (1) 14 tons farmyard manure per acre; (2) without manure of any kind since 1839; (3) sulphate of potash 200 lbs., soda 100 lbs., magnesia 100 lbs., and superphosphate 3.5 cwt. per acre; (4) minerals as in (3) and 200 lbs. sulphate of ammonia—43 lbs. N per acre; (5) minerals as in (3) and 400 lbs. sulphate of ammonia—86 lbs. N per acre; (6) minerals as in (3) and 600 lbs. sulphate of ammonia—129 lbs. N per acre; (7) minerals as in (3) and 550 lbs. nitrate of soda—86 lbs. N per acre.

and pests. In this brief article I must exclude consideration of this work and confine myself mainly to soils and fertilizers.

Increasing attention is being paid to the soil and fertilizer problems of the Commonwealth. Dr. Herbert Greene, with a long experience in the Sudan and for some years on the staff of the Food and Agriculture Organization in Washington, D. C., is Tropical Soils Adviser.

Among the points of keenest interest to many visitors to Rothamsted are the "Classical Experiments" with fertilizers. With one exception these experiments were started 100 or more years ago and have been maintained continuously since then. The best known is probably the famous wheat experiment in the Broadbalk field which is 11 acres planted to wheat continuously since 1843. Different fertilizer treatments have been used throughout that time. It should be remembered that when these experiments were begun in 1843 very little was known about commercial fertilizers as we know them today. Farmyard manure was the chief material used for keeping up the fertility of the soil. Bones were also used, but the supply was short. Knowledge regarding the sources of food of plants and the fertilizer requirements of the common farm crops was needed. To obtain this essential knowledge, one field was assigned to each of the important crops grown at that time. Some of them, as potatoes, have been discontinued; others have been maintained to this day. The fields were divided into strips and each strip received a different manurial treatment. Farmyard manure alone was used on some plots, and certain fertilizer materials supplying nitrogen, phosphoric acid, potash, and some other elements on the other plots (2).

The following are some of the main points that are clearly seen in the growing wheat of Broadbalk field:

"(1.) The very low level of production on the land continuously unmanured. This gave 17.2 bushels per acre over the first eight years, but has since very slowly declined to about 12 bushels, a yield about equal to the world average.

(2.) The satisfactory crops produced by farmyard manure, or by mixtures of fertilizers supplying nitrogen, phosphate, and potash which yield about the English average.

(3.) The poor results given by complete minerals without nitrogen and in the presence of minerals the good effect of increasing applications of nitrogen.

(4.) Nitrogen alone without minerals is not sufficient. The yield is slightly improved by phosphate, but more so by potash.

(5.) There are no appreciable residues from sulphate of ammonia."

When I visited these plots many years ago, the growth of weeds was causing a lot of trouble, particularly poppies and black bent. To eradicate the weeds and make it possible to obtain reliable yields of grain, in 1923 experiments were made with summer fallow. The method has been effective in reducing weeds. Before fallowing, some plots had 265 million poppy seeds and 65 million other weed seeds per acre. By fallowing, poppies were reduced one-half and bent almost eradicated. A fifth of each plot is now fallowed every year. Hence every season and for each manurial treatment there is a measure of the direct effect of a bare fallow and on other sections its 2nd, 3rd, and 4th years residual effects. In spite of fallowing, however, wild oats became serious in 1946 and are only kept within bounds by hand-pulling.

Another well-known, classical fertilizer experiment is the Park Grass. This field has been in grass for centuries and carried uniform herbage in 1856 when it was divided into plots

(*Turn to page* 39)

Fig. 1. A scene like this was most uncommon at the end of the drought in 1952, but this Coastal Bermuda pasture on the Dorsey Stock Farm near Opelika, Alabama, came through in good style.

Planting for Dry Spells

By J. Olan Cooper

Agricultural Experiment Station, Alabama Polytechnic Institute, Auburn, Alabama

WHAT are the probabilities of extended periods of dry weather in the Southern States each year?

During the last 50 years there have been 276 periods of three weeks or longer in northern Alabama when the total rainfall was less than one inch in the spring, summer, or fall months. In central Alabama there have been 277 such periods and in the Gulf Coast, 223.

These records further show that an average of about one three-week drought period or longer per year may be expected in the spring and summer, and between one and two periods in the fall, except in the Gulf Coast area where summer droughts have occurred an average of once every three years.

From this weather history it appears very likely that the farmers of Alabama and other states where rainfall records are very similar will face varying periods of moisture shortages every year. Research and observations have made it possible to offer certain suggestions that if followed should be helpful in lessening the effects of prolonged dry-weather conditions.

When cotton was the principal crop in the South, periods of moisture shortage were not seriously damaging unless very extended because cotton was recognized as a crop that oftentimes made its best growth when corn and other crops were being severely damaged by dry weather. However, in the last 20 years agriculture in the South has

Fig. 2. Lespedeza sericea, a deep-rooted perennial, provides considerable grazing on hill land and is not too severely injured by droughts.

undergone a revolution. It has changed from a one-crop cotton economy to a diversified farm economy.

During this period growing emphasis has been placed upon livestock and livestock products to supplement the income from cotton. Because of a favorable climate and through the use of improved varieties of grain and forage crops, better seedbed preparation, use of right kinds and amounts of fertilizers, and favorable price trend, countless thousands of acres have been diverted from cotton and other row-crops to permanent and temporary pastures.

The feed production program has been based mainly upon a grazing system that included both summer and winter growing crops. In the years immediately prior to 1950 during which the livestock industry was growing rapidly, weather conditions were generally favorable for production of grain and forage crops. But in 1950 farmers experienced a severe drought followed by a record-breaking cold winter. There was another unusually long period of dry weather in 1951, and then in 1952 records were broken throughout the country when one of the most serious droughts in history was recorded. The 1952 drought seared pasture sods in all sections of the South, and greatly limited production of temporary grazing in most areas. Most perennials were injured, but were quick to recover.

With the experiences of recent years still fresh in mind and a realization from studying weather history that varying periods of dry weather will probably be experienced every year, researchers of the Agricultural Experiment Station system of the Alabama Polytechnic Institute have drawn on their results and observations throughout the State and offer some suggestions that they believe will be helpful in lessening the impact of periods of moisture shortage.

In the Tennessee Valley area, sweet Sudan grass sown on land that produced a legume crop the previous winter has been the most dependable grazing crop in severe summer droughts. In the summer of 1952, it gave about 60 days of grazing. Lespedeza sericea gave fair grazing continuously from June until October. Small grain—

wheat, oats, and grain sorghum—outyielded corn in the ratio of about three to one. They were not growing during the severe drought and heat, of course, but these results emphasize the importance of having crops in addition to corn to help provide for grain needs if corn yields suffer.

Deep-rooted crops—alfalfa and lespedeza sericea in particular—have been of very great value in the livestock research program in the Sand Mountain or Appalachian Plateau region. They were all that was left for cattle to graze in the latter part of the summer of 1952, and their growth finally stopped because of the unprecedented lack of moisture. However, enough hay had been accumulated to provide for cattle needs not only throughout the remainder of the drought but through the winter following.

Exceptionally good results have been obtained at the Sand Mountain Substation with a ryegrass-crimson clover mixture for winter grazing. Success with this combination is attributed to doing the best job possible in preparing the land and seeding at the right time, rather than waiting for favorable moisture conditions. It has been found that if preparation and seeding are delayed until rains come, then the moisture supply oftentimes is so quickly reduced that it is of little benefit.

Earlier plantings and higher rates of nitrogen on corn have been beneficial in maintaining corn yields in the Sand Mountain area.

At the Upper Coastal Plain Substation, the value of both corn and grain sorghum for grain production has been noted. Whereas in 1951, the corn yield did not suffer greatly from a lack of moisture, the production of grain sorghum was seriously curtailed. In 1952 the situation was reversed, but by having two grain crops an almost normal hog production program was maintained over the two-year period.

The soils of part of the Upper Coastal Plain are underlain with a hardpan and under such a condition research has shown that one or two good crops of winter legumes or other sources of organic matter will maintain a shallow-rooted crop, such as corn, for two to three weeks of drought without serious damage.

As at other northern Alabama sub-

Fig. 3. Dallis grass in well-managed pastures furnishes grazing even in extended periods of dry weather.

stations, sericea proved its value as a forage crop during the drought years. Growing on sandy, gravelly hillsides formerly in broom sedge, it furnished grazing and produced hay while most other crops were making no growth whatever. While sericea did not make normal growth, it did save the day, so to speak, for cattle. Grasses that withstood dry weather best were Dallis on bottom land, Bermuda on hill land, and crabgrass. They were superior in this respect to fescue, orchard, and Kentucky bluegrass.

The importance of planting on time has been very apparent in tests at the Upper Coastal Plain Substation. There never has been a failure with a winter crop when the soil was prepared and the seed planted on time, regardless of how dry the soil was at this Substation.

Frost-to-frost Grazing

On soils that at one time had been severely eroded, lespedeza sericea at the Piedmont Substation furnished the beef herd with frost-to-frost grazing through the droughts of 1951 and 1952; the sericea was stocked at the rate of a cow and calf per one to one and one-half acres. In addition it was possible to harvest some hay. Kudzu also proved its value for emergency grazing, although it requires more careful management than sericea.

Sudan grass has proved valuable for summer grazing for the dairy herd at the Piedmont Substation, and the crimson clover-ryegrass combination, planted at the right time on well-prepared land is relied on for winter grazing.

In research work at the Black Belt Station, Dallis has been found to be the best grass for use in permanent pastures, and on fertile soils it has survived during periods of very serious droughts. Clovers that normally serve as perennials have been destroyed by prolonged dry periods, but stands were quickly re-established from natural reseeding. Johnson grass is relied upon heavily for emergency grazing and hay production. Lespedeza sericea has not given the satisfactory results obtained in other areas and is not recommended for Black Belt conditions.

At the Lower Coastal Plain Substation, Coastal Bermuda has performed well under extreme drought conditions, producing four tons of hay in two cuttings where the area had been stocked at the rate of a cow and calf per three acres. Established stands of sericea have also given good grazing, but new plantings have made little growth the first year because of moisture limitations.

Corn yields were increased 35 bushels per acre by three irrigations in 1952 at the Lower Coastal Plain Station.

Stocking of pastures at the anticipated low production of grazing and harvesting the surplus growth in peak periods as hay for use in such emergencies as drought are suggested by the Wiregrass Substation, located in southeastern Alabama, as important phases of management in livestock programs in that area. The saving of peanut hay is also urged.

In the Gulf Coast area, research during the past two years has shown that despite extreme dry weather, adapted varieties of grain sorghum have given satisfactory yields. Corn yields have been materially reduced by lack of moisture at this substation, but proper fertilization has been found to help offset the deficiency. By giving careful thought to the planning of pasture areas and keeping a reserve of grazing to rely on in case of a dry period, it has been found possible to have green grazing even under the extreme dry conditions of the past two years. And, by not overgrazing during the fall, good grazing is made possible in the winter following.

Summarizing, these Alabama substations have found that the deep-rooted crops such as alfalfa and sericea, where adapted, and Coastal Bermuda and Dallis grass in well-established stands offer good possibilities to the livestock producer for maintaining forage production in dry weather; that seasonal, temporary grazing can be provided

(*Turn to page* 36)

Strong Roots Make High Corn Yields

By H. J. Snider

Agronomy Department, University of Illinois, Urbana, Illinois

IT has frequently been observed on fertilized land that crops respond beyond what would normally be expected from the actual amounts of plant-food elements added. This has been especially true on the light-colored Cisne silt loam soils which make up a large part of the farm lands in southern Illinois.

Some of this unusual response has been variously attributed to fertilizer stimulation, increased activity of soil organisms, balancing of the required plant nutrition, and other causes. These are all possibilities and may occur on land which has been limed, crops rotated, legumes grown, and fertilizers added. In this connection there has been some research carried out recently by Professor Joe Fehrenbacher and his associates of the Illinois Soil Survey, which strongly indicates that it is root stimulation caused by the above soil improvement practices which adds

Fig. 1. Professor Fehrenbacher in a pit dug on the Toledo field in 1952 is shown chiseling out the slabs of soil to be removed for washing out the roots. At his left is a 4 x 12 x 60-inch wooden tray in place ready to remove with the slab of soil containing the corn roots from under a single hill of corn.

greatly to the acre yield of Midwest crops, and more particularly corn.

Professor Fehrenbacher actually dug this information out of the bowels of the earth. The conclusions were that the 75-bushel yield of corn on the Toledo experiment field in 1952 was due in a large part to vigorous corn roots reaching into the subsoil for a part of the needed moisture. The 1952 season on the Toledo field was very dry from corn planting almost to the maturity of the crop, as indicated by rainfall records kept on the field. The last rain of any consequence was 1.4 inches on June 10. From this time on to September 1 there were five scattered showers which totaled 2.15 inches in the 2½ months which are so critical for the corn crop. Under these conditions the treated (LPK) land yielded 75 bushels and the untreated land made 20 bushels an acre. This 55-bushel difference was nearly a threefold increase and under the conditions could hardly be attributed entirely to the actual plant-food elements added by the treatment. The land was limed, had legumes and cornstalks turned under, and finely ground rock phosphate and muriate of potash were added (LPK).

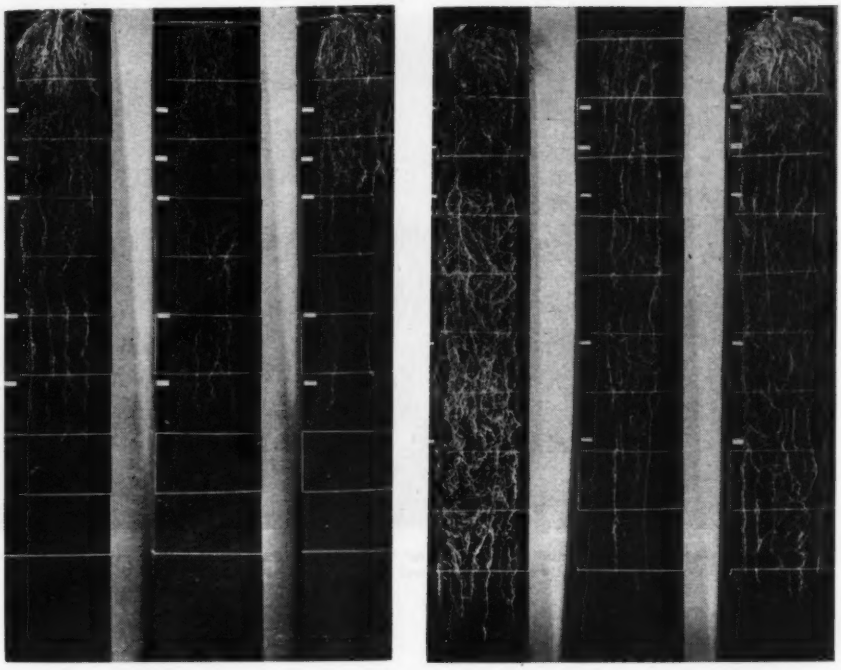
On this Cisne soil, the B horizon which begins at 16 inches and extends to 41 inches in depth, is the claypan subsoil. It is stiff, hard, and difficult to deal with. The D horizon begins at 41 inches and extends down to 55 inches below the surface. This subsoil (16 to 55 inches) under the treated surface contained 18.6% moisture and the corresponding horizon under the untreated surface contained 23.7% moisture. These measurements taken September 1 gave 5.1 percentage points more moisture under the untreated plot than under the treated (LPK) plot where the corn roots penetrated freely. This moisture difference between these two plots was quite pronounced at sampling time and this along with the difference in root growth (Figs. 2 and 3) indicates that the 1952 corn crop was greatly benefited by this subsoil moisture and probably there was some uptake of subsoil nutrients.

The volume in this subsoil, 16 to 55 inches, amounts to something like 12 million pounds to the acre. The difference in moisture content indicates that the corn crop may have taken around 300 tons more moisture from the subsoil of the treated land as compared to that where the land was untreated.

The difference in the amount of corn roots under the treated and untreated land is evidence that subsoil moisture and possibly subsoil nutrition helped considerably in the production of the 55 extra bushels of corn on this Cisne soil. The corn roots in Fig. 3 show that the roots went through the claypan and also branched profusely in this horizon, 16 to 41 inches. This branching and penetration extended well on to the 5-foot depth. Under the corn, on the untreated soil, root penetration extended only past the 3-foot depth and with scarcely no branching as indicated in Fig. 2. All corn roots were from the same vigorous hybrid, Funk's G 91.

The topsoil (0-7") of the treated plot contained 78.7% of the total root growth and the topsoil of the untreated plot contained 91% of the total roots. On the treated land there were 3,660 pounds of roots in the topsoil and an additional 990 pounds in the 7 to 55-inch depth, a total of 4,650 pounds of roots an acre on the dry basis. On the untreated plot there were 1,480 pounds of roots in the topsoil and an additional 150 from 9 inches down to 55 inches, a total of 1,630 pounds an acre on this plot.

The chemical composition of the corn roots showed only slight differences in percentages of nitrogen, phosphorus, calcium, and magnesium but rather large differences in percentages of potassium in comparison between the treated and untreated plots. Roots from the treated plot contained 1.61% potassium in the top 7 inches and 0.95% potassium in roots from the 7 to 55-inch area. Roots under the untreated soil con-



Figs. 2 and 3. Corn roots taken from a depth of 60 inches on Cisne silt loam—Fig. 2 left, untreated; Fig. 3 right, treated (LPK). Roots in the panels on the left and right in the pictures were taken under two adjacent three-stalk hills of corn. The center panel was removed midway between the two hills. The white lines across the panels are six inches apart and indicate the full depth of corn root penetration on the Toledo experiment field September 1, 1952.

tained 0.34% potassium in the top 9 inches and 0.51% in 9 to 55-inch depth. There were 68.3 pounds of potassium an acre in the roots of the treated soil, 58.9 in the surface, and 9.4 pounds in the subsoil. There were only 5.8 pounds potassium in the corn roots of the untreated land, 5 pounds in the surface, and .8 of a pound in the subsoil. Under these conditions there would be considerable left in the soil where potash fertilization was practiced, and a very large portion of this was in the topsoil.

The amount of corn root growth on treated land of the Cisne silt loam equaled the root growth on some of the more productive Illinois soils. Corn roots removed to a depth of 6 feet on treated soils were as follows: Muscatine silt loam 4,340 pounds dry matter an acre; Elliott silt loam 4,280; and Cisne silt loam 4,650 pounds an acre.

This root study was accomplished by removing the corn roots in trays of soil which were 4 inches thick, 12 inches wide, and 72 inches deep. Pits were dug to the required depth, blocks of soil were chiseled to size (Fig. 1), and the trays were fitted snugly over these. The removal was completed by cutting behind the slab in the tray, working it away from the soil face, and finally lifting it from the pit. One of these trays was taken from under each of two adjacent hills of corn with three stalks each. An additional slab or tray was removed midway between the two hills (Figs. 2 and 3). The soil held in the trays was washed away, leaving the roots exposed in approximately the position occupied in the soil to the depth of their penetration. Soil samples were removed from various parts of the profile and physical and chemical determinations were made.

Fig. 1. First-year crop of rescue grass sown in November 1952 making a good seed crop the following May. ***Courtesy BPISAE, USDA.***

Recent Trials With Rescue Grass

By B. H. Hendrickson[1]

Watkinsville, Georgia

RESCUE grass, *Bromus catharticus,* is emerging from 100 years of comparative obscurity in the Southeast and is now finding its place in our grassland program. We find it to be particularly useful as a reseeding cool weather grower and winter grazing pasture grass, alone or in combination with reseeding crimson clover, and as a heavy yielder of high quality seed. In the Southern Piedmont, and on some of the better Coastal Plain soils as well, it is acting as a perennial. The perennial plants tolerate the heat of summer and when topdressed in the fall with moderate applications of complete fertilizer they put on vigorous fall and winter growth, producing high quality winter-hardy pasturage.

Rescue grass was appropriately named by a Georgian a century ago. Its culture as a forage crop has been generally neglected because it reseeds profusely like its relative, "cheat," and like it may become a pest in grain fields, particularly in oats.

To avoid this, we sow tall fescue instead where we expect to grow small grains in rotations, and with this perennial grass we generally use the fescue-ladino and crimson clover combination, or fescue-alfalfa. Fescue does not reseed. When the sod is turned under the grass dies, leaving a clean field.

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Fig. 2. Appearance of a perennial stand of rescue grass in its second winter in December. The larger plants are surrounded by a thick growth of volunteer seedlings that assure full ground coverage of this palatable winter-grazing grass. *Courtesy SCS, USDA.*

The rescue-crimson clover sod also makes an excellent winter cover crop type of sod for turning under in the spring to be followed by cotton, corn, or other summer row crop. The indications are that both the grass and the clover will reseed the field in the fall if, after combining seed in late May, the stubble is disced down and followed by a summer catch crop, such as dwarf grain sorghum in rows.

Rescue grass requires a reasonably good fertility level, and like all grasses it responds to nitrogen. To sow rescue

Fig. 3. Combine-harvesting the rescue grass-reseeding Dixie crimson clover combination stand in late May 1953. The "straw" of this mixture is heavily mixed with green rescue leaves, making a fairly good grade of hay as a by-product. *Courtesy BPISAE, USDA.*

grass, we prepare a disc-harrowed seedbed as for oats, or follow cotton in October, and fertilize as for a good crop of oats but plant differently by mixing 5 pounds of Chapel Hill rescue seed with 100 pounds of 4-12-12 fertilizer and drilling the mixture through the fertilizer side of the grain drill, opened up a few notches to put out 400 pounds per acre of fertilizer and 20 pounds per acre of rescue seed. To plant for the combination sod, we then follow with inoculated reseeding crimson clover seed broadcast at the rate of 10-15 pounds per acre, and cultipack. A late fall topdressing of 16 pounds per acre of N is known to be beneficial to both the grass and the clover.

Both grass and clover mature seed nearly enough at the same time in May to allow combine harvesting together, but heavier rescue stands and seed yields are secured from pure rescue stands. Excellent first-year seed yields in excess of 1,000 pounds per acre have been secured following topdressings of 66 pounds per acre of N in March. Two- and three-year stands of rescue on the Station, regularly fall and winter grazed, are improving in foliage production as well as in seed yield.

During the severe drouths of 1952, rescue plants of perennial habit survived well enough to provide a light seed crop in October, substantial amounts of fall grazing, considerable winter grazing, and a heavy seed crop in May of 1953. As all livestockmen are aware, the dry September-October fall period is a critical one from the pasturage standpoint, as the summer grasses are then old and tough. New seedings of the winter annuals such as oats, ryegrass, and crimson clover are rarely available for grazing until late November, and in some years not until late winter or early spring. Perennial rescue promises to fill this gap.

In many areas the most critical pasture period of the year occurs in midwinter, usually during the months of January and February, when some supplemental barn feeding is almost always required to keep beef cattle in good condition. Rescue grows during mild spells in the winter very much as does oats. The tall fescue helps out, provided it was not grazed down prior to winter. Although it remains green, this grass makes very little growth during the winters.

Our experience indicates that the three types of pastures mentioned can be expected to supply full feed grazing in most winters at the rate of 2 to 3 acres per cow unit, whereas they will carry 2 or more cows per acre during their flush spring growing periods. Alternate controlled grazing of winter pastures is good practice to avoid overgrazing, especially in the rescue and oats-ryegrass pastures with crimson clover.

Rescue grass is extremely palatable to hogs, dairy and beef cattle. Cattle will leave lush early spring pastures of oats, ryegrass, and crimson clover to graze on rescue grass, if they have access to both.

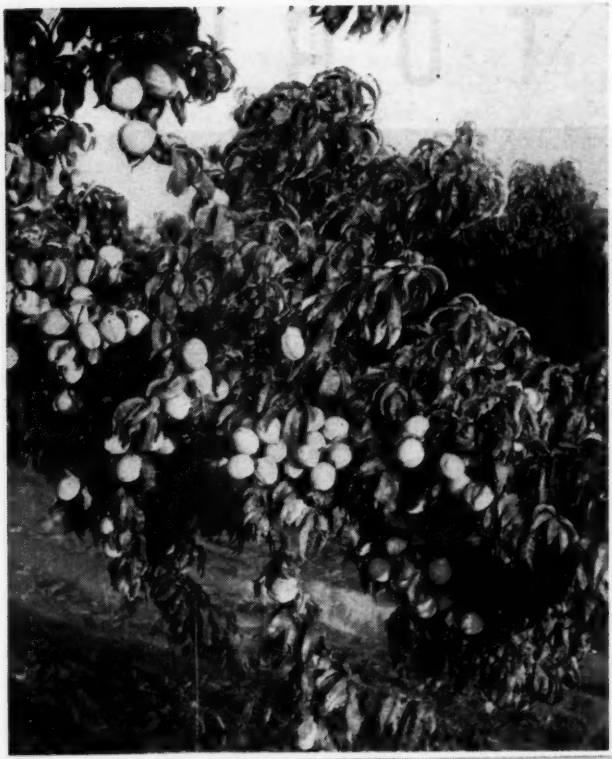
The Chapel Hill strain of rescue, named for the Chapel Hill, N. C. nursery of the SCS where it was selected, is well adapted in the Southeast. It is resistant to head smut, and reason-

(*Turn to page* 39)

Fig. 4. The volunteer combination of rescue grass and crimson clover, useful for winter grazing, for seed production, and as a rotation-base grass-legume sod. *Courtesy BPISAE, USDA.*

PICTORIAL

Nice Crop!



Full Trees

Make

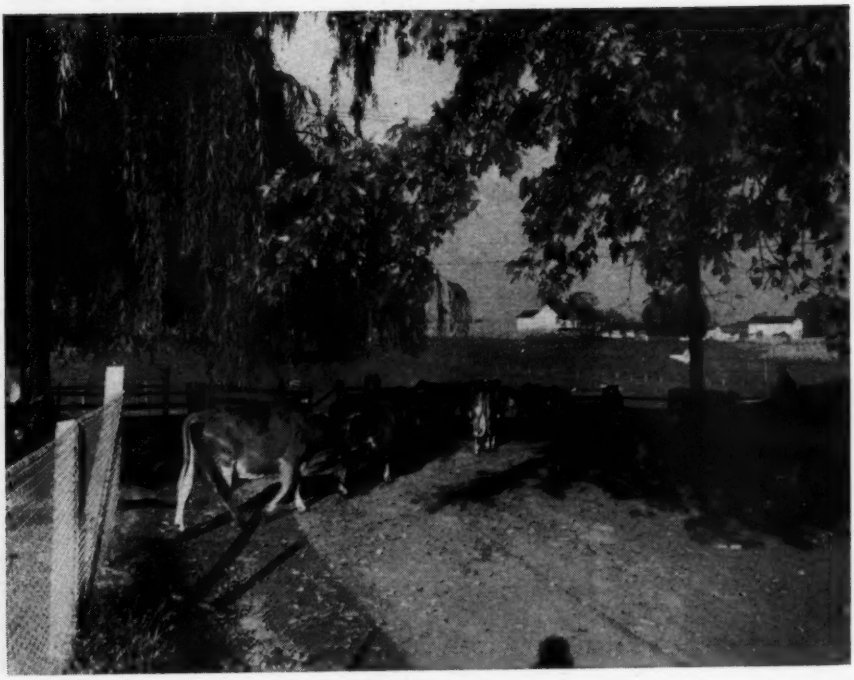
Full Loads

Result of

Clean

Threshing

Good pasture makes a difference . . .



The Editors Talk

Our Cover Picture

"Curl leaf" symptoms on sour cherry trees appear when potassium becomes the limiting factor. The symptoms, cupped leaves with a brown marginal scorch and lack of terminal growth when the deficiency is severe, are prevalent on both bearing and non-bearing trees. The deficiency can be detected first by the cupping of the older leaves. In the older trees the first "curl leaf" symptoms will be noted in the topmost branches. Although the trees can survive under a rather severe deficiency of this type, growth and fruiting are limited.

The colored cover picture illustrates the types of leaf and twig growth from young cherry trees—(left) fertilized with potash, (right) potash-starved. These samples were taken in the orchard of Spencer Eames, Egg Harbor, Wisconsin, August 6, 1952, from an experiment being conducted by the Peninsula Branch Experiment Station of the University of Wisconsin, located near Sturgeon Bay, Wisconsin. The orchard nutrition studies are under the supervision of Professor F. A. Gilbert. The normal twig (left) represents only one year of new growth. The potash-starved branch (right) illustrates the cupping and scorching of leaves on several years' annual growth.

The Door County, Wisconsin, cherry-growing area is on a peninsula extending out between Lake Michigan and Green Bay. The soil is residual from limestone and underlain with limestone at variable depths. Most soils are alkaline or near neutral. Limestone particles throughout these soils, in sizes from silt or gravel to larger rocks, are a constant source of calcium and alkalinity. This is the condition with which orchardists must learn to live. One cannot expect to fully convert the alkalinity. Under such conditions, a constant supply of available potassium is necessary from fertilizers, or from mulch materials used for stabilizing moisture conditions within root zones.

In the past, many cherries were grown by dairy farmers. They used manure mulches for supplying nitrogen, and automatically took care of some of the potassium needs. As cherry-growing expanded and most of the nitrogen was supplied from chemical sources, the need for more potassium became more evident, especially on younger plantings.

Trees in a Fish Creek, Door County, orchard showed extreme deficiency symptoms in 1950. Different fertilizer treatments were applied by Professor Gilbert in the fall of that year. Trees treated with nitrogen alone yielded 6½ pails of cherries. Those treated with nitrogen plus five pounds of high-potash fertilizer (0-0-60) yielded almost 11 pails, and trees which received nitrogen plus 10 pounds of 0-0-60 yielded more than 15½ pails.

Furthermore, the trees receiving potash yielded larger cherries which ripened more evenly. Trees fertilized with nitrogen alone yielded 60% fully mature cherries; those treated with nitrogen plus 10 pounds of 0-0-60 yielded 87½% mature cherries.

In another of these test orchards, Professor Gilbert studied the effects of different fertilizer treatments on tree growth. He also studied the mineral content of the soil and leaf tissue of deficient and healthy trees. Leaf samples from deficient trees were low in phosphorus and potash. They didn't contain as much moisture, but had larger amounts of calcium than leaves from normal trees.

Soil tests around infected trees showed a very low content of potash in plots which had been fertilized with nitrogen alone. The trees receiving a complete fertilizer made the best growth during the season.

If potash fertilizers are not applied until midseason, after the "curl leaf" symptoms become more evident, one cannot expect the full correction of these potash-hunger signs the first year. Potash does not seem to affect the foliage growth as rapidly as orchardists expect from nitrogen applications. For this reason, some orchardists have been disappointed temporarily following the first application of potash. Summer or fall applications of potash will produce normal growth by the next season. Annual applications, spring or fall, will maintain normal growth of new wood and prevent the "curl leaf."

Fall Fertilization

Much is stemming from the agricultural advisory groups in the way of urging farmers to order and apply fertilizer this fall. It will lessen the rush of work next spring; roads and fields are drier; deliveries will be prompter; and the fertilizer will be well-cured. Applications can be made before plowing for fall seedings and as top-dressings for alfalfa, other legumes, and pastures. Used for winter crops, fertilizer will help obtain a good growth to keep the soil from eroding and the leaching of its fertility.

An August 21 release from the University of Illinois has this to say particularly with respect to potash:

"There's good news for farmers this week in the price and supply situation for muriate of potash. The plant-food material is now priced below prewar. And there is a plentiful supply.

"This doesn't mean that dealers will carry large enough supplies to meet peak demand. So it will be good business, according to a University of Illinois Soils Specialist, to order potash now and take delivery whenever the dealer can fill the order.

"C. M. Linsley says that muriate of potash can be stored in the soil as well as in the barn. Farmers can apply it any time this summer or fall to fields that need it.

"The material can be spread on stubble clover or clover sod to be plowed under, or on pastures or hayfields. Where land is not too rolling, it can be applied on soybean stubble where small grain and clover or alfalfa are to follow next year.

"A soil test is the only sure way to tell whether or not the land needs potash, the soils man points out. The test will tell you not only whether a field needs the plant food, but exactly how much it needs per acre. The soil test also tells how much lime and phosphorus are needed, if any.

"Before ordering a supply of muriate of potash, Linsley advises a farmer who has not tested his soil to see his county farm adviser for instructions on how to take soil samples for testing."

All of this is good advice. It is to be hoped that more and more farmers will have their soils tested this fall and avoid probable delays in getting back the reports due to rush of testing work at the laboratories next spring. On receipt of the reports, efficient management calls for fall fertilization wherever possible.

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb. Aug.-July	Tobacco Cents per lb.	Potatoes Cents per bu. July-June	Sweet Potatoes Cents per bu. July-June	Corn Cents per bu. Oct.-Sept.	Wheat Cents per bu. July-June	Hay [1] Dollars per ton July-June	Cottonseed Dollars per ton July-June	Truck Crops ....
Av. Aug. 1909–July 1914	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1927	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937	8.4	20.4	52.9	78.0	51.8	96.2	8.74	19.51	....
1938	8.6	19.6	55.7	69.8	48.6	56.2	6.78	21.79	....
1939	9.1	15.4	69.7	73.4	56.8	69.1	7.94	21.17	....
1940	9.9	16.0	54.1	85.4	61.8	68.2	7.59	21.73	....
1941	17.0	26.4	80.8	92.2	75.1	94.4	9.70	47.65	....
1942	19.0	36.9	117.0	118.0	91.7	110.0	10.80	45.61	....
1943	19.9	40.5	131.0	206.0	112.0	136.0	14.80	52.10	....
1944	20.7	42.0	150.0	190.0	109.0	141.0	16.50	52.70	....
1945	22.5	36.6	143.0	204.0	127.0	150.0	15.10	51.10	....
1946	32.6	38.2	124.0	218.0	156.0	191.0	16.70	72.00	....
1947	31.9	38.0	162.0	217.0	216.0	229.0	17.60	85.90	....
1948	30.4	48.2	155.0	222.0	129.0	200.0	18.45	67.20	....
1949	28.6	45.9	128.0	214.0	124.0	188.0	16.50	43.40	....
1950	40.1	51.7	91.7	173.0	153.0	200.0	16.70	86.50	....
1951	37.9	51.2	163.0	306.0	168.0	211.0	19.50	69.30	....
1952									
August	37.92	48.8	278.0	410.0	173.0	204.0	19.35	69.80	....
September	39.11	51.0	222.0	335.0	171.0	209.0	20.25	69.60	....
October	36.77	50.9	211.0	294.0	153.0	207.0	20.85	70.70	....
November	34.05	47.6	217.0	311.0	145.0	213.0	21.25	69.70	....
December	31.71	49.6	199.0	362.0	150.0	212.0	21.65	68.50	....
1953									
January	29.79	46.2	206.0	386.0	148.0	210.0	21.65	65.30	....
February	30.19	36.7	179.0	384.0	143.0	205.0	20.85	64.50	....
March	31.52	....	165.0	401.0	146.0	210.0	19.65	63.60	....
April	31.45	....	134.0	409.0	146.0	208.0	18.85	63.10	....
May	31.73	51.5	115.0	413.0	149.0	206.0	17.95	61.80	....
June	31.51	51.0	102.0	398.0	146.9	188.0	16.05	61.20	....
July	31.87	51.2	95.5	402.0	147.0	187.0	15.45	59.00	....
Index Numbers (Aug. 1909—July 1914 = 100)									
1927	163	207	146	124	132	135	87	154	127
1928	145	200	76	134	131	113	95	152	154
1929	135	183	189	133	124	117	92	137	137
1930	77	128	131	123	93	76	93	98	129
1931	46	82	66	83	50	44	73	40	115
1932	52	105	55	62	50	43	52	46	102
1933	82	130	118	79	81	84	68	57	91
1934	100	213	64	91	127	96	111	146	95
1935	90	184	85	80	102	94	63	135	119
1936	100	236	164	106	163	116	94	148	104
1937	68	204	76	89	81	109	74	87	110
1938	69	196	80	79	76	64	57	97	88
1939	73	154	100	84	88	78	67	94	91
1940	80	160	78	97	96	77	64	96	111
1941	137	264	116	105	117	107	82	211	129
1942	153	369	168	134	143	124	91	202	163
1943	160	405	188	235	174	154	125	231	245
1944	167	420	214	216	170	160	139	234	212
1945	181	366	205	232	198	170	127	227	207
1946	263	382	178	248	212	209	141	319	182
1947	257	380	232	248	336	259	148	381	226
1948	245	482	222	253	201	226	155	298	214
1949	231	459	184	244	193	213	139	192	201
1950	323	517	132	197	238	226	141	384	185
1951	306	512	233	349	262	239	164	307	239
1952									
August	306	488	399	467	269	231	163	310	229
September	315	510	319	382	266	236	171	309	182
October	297	509	303	335	238	234	176	314	189
November	275	476	311	354	226	241	179	309	238
December	256	496	286	412	234	240	182	304	256
1953									
January	240	462	296	440	231	238	182	290	237
February	243	367	257	437	223	232	176	286	237
March	254	...	237	457	227	238	166	282	248
April	254	...	192	466	227	235	159	280	204
May	256	515	165	470	232	233	151	274	182
June	254	510	146	453	227	213	138	271	270
July	257	512	137	458	229	212	130	262	216

Wholesale Prices of Ammoniates

	Nitrate of soda bulk per unit N	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia, Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.37	$3.52
1927	3.01	2.26	5.07	5.87	4.32	5.70
1928	2.67	2.30	7.06	6.63	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.61	5.72
1930	2.47	1.81	4.78	4.96	3.79	4.58
1931	2.34	1.46	3.10	3.95	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.67	3.27
1935	1.47	1.15	4.59	3.10	3.06	3.65
1936	1.53	1.23	4.17	3.42	3.58	4.25
1937	1.63	1.32	4.91	4.66	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.76	4.43
1942	1.74	1.41	6.11	5.77	5.04	6.76
1943	1.75	1.42	6.30	5.77	4.86	6.62
1944	1.75	1.42	7.68	5.77	4.86	6.71
1945	1.75	1.42	7.81	5.77	4.86	6.71
1946	1.97	1.44	11.04	7.38	6.60	9.33
1947	2.50	1.60	12.72	10.66	12.63	10.46
1948	2.86	2.03	12.94	10.59	10.84	9.85
1949	3.15	2.29	10.11	13.18	10.73	10.62
1950	3.00	1.95	11.01	11.70	10.21	9.36
1951	3.16	1.97	13.20	10.92	10.18	10.09
1952						
August	3.34	2.07	14.26	11.28	9.78	7.89
September	3.34	2.07	13.39	11.25	11.11	10.02
October	3.34	2.07	13.39	11.24	10.62	9.41
November	3.34	2.07	13.31	11.24	10.32	9.71
December	3.34	2.26	13.20	11.24	9.95	9.17
1953						
January	3.34	2.28	13.25	11.24	8.43	8.05
February	3.34	2.28	13.21	11.24	7.75	7.28
March	3.34	2.28	12.69	11.24	7.16	6.56
April	3.34	2.28	11.75	11.24	6.07	6.00
May	3.34	2.28	10.34	11.24	6.23	6.14
June	3.34	2.28	10.61	11.26	6.62	6.31
July	3.34	2.28	10.34	11.15	6.75	6.14
Index Numbers (1910-14 = 100)						
1927	112	79	145	166	128	162
1928	100	81	202	188	146	170
1929	96	72	161	142	137	162
1930	92	64	137	141	112	130
1931	88	51	89	112	63	70
1932	71	36	62	62	36	39
1933	59	39	84	81	97	71
1934	59	42	127	89	79	93
1935	57	40	131	88	91	104
1936	59	43	119	97	106	131
1937	61	46	140	132	120	122
1938	63	48	105	106	93	100
1939	63	47	115	125	115	111
1940	63	48	133	124	99	96
1941	63	49	157	151	112	126
1942	65	49	175	163	150	192
1943	65	50	180	163	144	189
1944	65	50	219	163	144	191
1945	65	50	223	163	144	191
1946	74	51	315	209	196	265
1947	93	56	363	302	374	297
1948	107	71	370	300	322	280
1949	117	80	289	373	318	302
1950	112	68	315	331	303	266
1951	118	69	377	310	302	287
1952						
August	125	73	407	320	290	224
September	125	73	383	319	330	285
October	125	73	383	318	315	267
November	125	73	380	318	306	276
December	125	79	377	318	295	261
1953						
January	125	80	379	318	250	229
February	125	80	378	318	230	207
March	125	80	363	318	212	186
April	125	80	336	318	180	170
May	125	80	295	318	185	174
June	125	80	303	319	196	179
July	125	80	295	316	200	174

Wholesale Prices of Phosphates and Potash **

	Superphosphate, Baltimore, per unit	Florida land pebble, 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports[2]	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports[2]	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports[2]	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[2]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657
1927	.525	3.09	5.50	.646	.924	25.55	.586
1928	.580	3.12	5.50	.669	.957	26.46	.607
1929	.609	3.18	5.50	.672	.962	26.59	.610
1930	.542	3.18	5.50	.681	.973	26.92	.618
1931	.485	3.18	5.50	.681	.973	26.92	.618
1932	.458	3.18	5.50	.681	.963	26.90	.618
1933	.434	3.11	5.50	.662	.864	25.10	.601
1934	.487	3.14	5.67	.486	.751	22.49	.483
1935	.492	3.30	5.69	.415	.684	21.44	.444
1936	.476	1.85	5.50	.464	.708	22.94	.505
1937	.510	1.85	5.50	.508	.757	24.70	.556
1938	.492	1.85	5.50	.523	.774	15.17	.572
1939	.478	1.90	5.50	.521	.751	24.52	.570
1940	.516	1.90	5.50	.517	.730	24.75	.573
1941	.547	1.94	5.64	.522	.780	25.55	.367
1942	.600	2.13	6.29	.522	.810	25.74	.205
1943	.631	2.00	5.93	.522	.786	25.35	.195
1944	.645	2.10	6.10	.522	.777	25.35	.195
1945	.650	2.20	6.23	.522	.777	25.35	.195
1946	.671	2.41	6.50	.508	.769	24.70	.190
1947	.746	3.05	6.60	.432	.706	18.93	.195
1948	.764	4.27	6.60	.397	.681	14.14	.195
1949	.770	3.88	6.22	.397	.703	14.14	.195
1950	.763	3.83	5.47	.371	.716	14.33	.195
1951	.813	3.98	5.47	.401	.780	15.25	.200
1952							
August	.860	3.98	5.47	.386	.768	14.72	.193
September	.860	3.98	5.47	.389	.768	14.72	.193
October	.860	3.98	5.47	.391	.768	14.72	.193
November	.860	3.98	5.47	.391	.768	14.72	.193
December	.860	3.98	5.47	.427	.827	16.00	.210
1953							
January	.860	3.98	5.47	.430	.827	16.00	.210
February	.860	3.98	5.47	.430	.827	16.00	.210
March	.860	4.22	5.47	.430	.827	16.00	.210
April	.860	4.28	....	.430	.827	16.00	.210
May	.860	4.28	....	.430	.827	16.00	.210
June	.860	4.28	....	.361	.708	13.44	.176
July	.895	4.28	....	.396	.768	14.72	.193
			Index Numbers (1910-14 = 100)				
1927	100	86	113	90	97	106	89
1928	108	86	113	94	100	109	92
1929	114	88	113	94	101	110	93
1930	101	88	113	95	102	111	94
1931	90	88	113	95	102	111	94
1932	85	88	113	95	101	111	94
1933	81	86	113	93	91	104	91
1934	91	87	110	68	79	93	74
1935	92	91	117	58	72	89	68
1936	89	51	113	65	74	95	77
1937	95	51	113	71	79	102	85
1938	92	51	113	73	81	104	87
1939	89	53	113	73	79	101	87
1940	96	53	113	72	77	102	87
1941	102	54	110	73	82	106	87
1942	112	59	129	73	85	106	84
1943	117	55	121	73	82	105	83
1944	120	58	125	73	82	105	83
1945	121	61	128	73	82	105	83
1946	125	67	133	71	81	102	82
1947	139	84	135	70	74	78	83
1948	143	118	135	67	72	58	83
1949	144	108	128	67	74	58	83
1950	142	106	112	68	75	59	83
1951	152	110	112	72	82	63	83
1952							
August	160	110	112	70	81	61	82
September	160	110	112	70	81	61	82
October	160	110	112	70	81	61	82
November	160	110	112	70	81	61	82
December	160	110	112	75	87	66	85
1953							
January	160	110	112	76	87	66	85
February	160	110	112	76	87	66	85
March	160	117	112	76	87	66	85
April	160	119	...	76	87	66	85
May	160	119	...	76	87	66	85
June	160	119	...	66	74	56	80
July	167	119	...	71	81	61	82

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and all Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer material‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash**
1927.....	141	148	139	116	89	150	100	94
1928.....	149	152	141	121	87	177	108	97
1929.....	148	150	139	114	79	146	114	97
1930.....	125	140	126	105	72	131	101	99
1931.....	87	119	107	83	62	83	90	99
1932.....	65	102	95	71	46	48	85	99
1933.....	70	104	96	70	45	71	81	95
1934.....	90	118	109	72	47	90	91	72
1935.....	109	123	117	70	45	97	92	63
1936.....	114	123	118	73	47	107	89	69
1937.....	122	130	126	81	50	129	95	75
1938.....	97	122	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	123	130	127	86	56	130	102	77
1942.....	158	149	144	93	57	161	112	77
1943.....	192	165	151	94	57	160	117	77
1944.....	196	174	152	96	57	174	120	76
1945.....	206	180	154	97	57	175	121	76
1946.....	234	197	177	107	62	240	125	75
1947.....	275	231	222	130	74	362	139	72
1948.....	285	250	241	134	89	314	143	70
1949.....	249	240	226	137	99	319	144	70
1950.....	256	246	236	132	89	314	142	72
1951.....	302	271	263	139	93	331	152	76
1952								
August....	295	274	252	144	98	337	160	73
September.	288	271	250	145	98	349	160	74
October...	282	269	248	145	98	341	160	74
November.	277	268	248	144	98	336	160	74
December..	269	267	246	146	101	329	160	79
1953								
January...	267	267	246	144	102	307	160	80
February..	263	264	246	142	102	296	160	80
March....	264	265	248	141	102	282	160	80
April.....	259	264	246	139	102	256	160	80
May.....	261	264	247	137	102	245	160	80
June.....	259	260	246	135	102	253	160	70
July.....	259	261	249	138	102	252	167	75

* U. S. D. A. figures, revised January 1950. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning July 1949, baled hay prices reduced by $4.75 a ton to be comparable to loose hay prices previously quoted.

[2] All potash salts now quoted F.O.B. mines only; manure salts since June 1941, other carriers since June 1947.

**** The weighted average of prices actually paid for potash is lower than the annual average because since 1926 over 90% of the potash used in agriculture has been contracted for during the discount period. The maximum discount is now 16%. Applied to muriate of potash, a price slightly above $.353 per unit K_2O thus more nearly approximates the annual average than do prices based on arithmetical averages of monthly quotations.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Fertilizer and Fertilizer Material, Fiscal Yr. 1950-51," Ala. Dept. of Agr. and Industries, Montgomery, Ala., Dept. Bul. No. 56.

"Fertilizing Materials, 1952," Dept. of Agr., Sacramento 14, Calif., Spcl. Publ. No. 247, Feb. 1953.

"Bulk Spreading of Limestone," Agr. Ext. Serv., Univ. of Conn., Storrs, Conn., Fldr. 65, Feb. 1953, R. I. Munsell.

"Fertilizers, Fertilizer Materials and Rock Phosphate Sold in Illinois, July 1, 1952, to December 31, 1952," Dept. of Agronomy, Univ. of Ill., Urbana, Ill., AG 1576, May 1953, T. Kurtz and N. G. Pieper.

"Rate, Placement, and Source of Phosphorus Fertilizers for Potatoes in Maine," Agr. Exp. Sta., Univ. of Maine, Orono, Maine, Bul. 506, Sept. 1952, G. L. Terman, A. Hawkins, C. E. Cunningham, and P. N. Carpenter.

"Facts About Fertilizing Blueberries," Agr. Exp. Sta., Rutgers Univ., New Brunswick, N. J., Cir. 550, Feb. 1953, C. A. Doehlert.

"Fertilizer and Lime Recommendations for New Jersey," Agr. Exp. Sta., Rutgers Univ., New Brunswick, N. J., Cir. 552, May 1953.

"Fertilizer Helps Crops," Dept. of Agronomy, N. D. Agr. College, Fargo, N. D., Cir. A-187, Jan. 1953, E. B. Norum and R. B. Widdifield.

"Charts and Maps Showing Fertilizer Consumption in Oklahoma 1951-52," State Dept. of Agr., Oklahoma City 5, Okla.

"Leaf Concentrations of Five Elements in Relation to Optimum Nutrition of a Number of Horticultural Crops," Agr. Exp. Sta., Penna. State College, State College, Penna., Bul. 564, March 1953, W. Thomas, W. B. Mack, and C. B. Smith.

"Fertilization Experiments with Burley Tobacco Plant Beds," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Bul. 231, March 1953, B. C. Nichols and J. E. McMurtry, Jr.

"Nitrogen and Spacing Experiments With Corn," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Bul. No. 232, March 1953, O. H. Long.

"Cotton Fertilizer Tests in the El Paso Area, 1943-51," Tex. Agr. Exp. Sta., College Sta., Tex., Bul. 758, March 1953, P. D. Christensen and P. J. Lyerly.

"Legume Seed Yields Increased by Borax Fertilization," Agr. Exp. Sta., Miss. State College, State College, Miss., Inf. Sheet 475, Oct. 1952, L. N. Wise.

"Anhydrous Ammonia as a Good Source of Nitrogen for Tung," Agr. Exp. Sta., Miss. State College, State College, Miss., Inf. Sheet 477, Nov. 1952, W. W. Kilby, B. G. Sitton, and W. A. Lewis.

Soils

"Soil Testing, A Tool For Improved Soil Management," Agr. Exp. Sta., Dept. of Soils, New Haven, Conn., Spcl. Bull. Soils XIII, C. L. W. Swanson.

"Soils and Fertilizers for Florida Vegetable and Field Crops," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 514, Feb. 1953, S. N. Edson and F. B. Smith.

"Maintaining Fertility in Mineral Soils Under Permanent Pasture," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 515, March 1953, N. Gammon, Jr., W. G. Blue, J. R. Neller, D. W. Jones, H. W. Lundy, and G. E. Ritchey.

"Soils Do Respond," Agr. Ext. Serv., Univ. of Idaho, Moscow, Idaho, Ext. Cir. 128, Feb. 1953, V. T. Smith.

"Brownstown Soil Experiment Field, 1940-52—General Summary of Results," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., AG 1529a, 1953, F. C. Bauer and P. E. Johnson.

"Using the Soil Survey and Land Capability Unit Maps," Agr. Ext. Serv., Univ. of Md., College Park, Md., Fact Sheet 63, C. P. Ellington, F. L. Bent, and M. F. Hershberger.

"Test Your Soil for Better Crops and Higher Profits," Coop. Ext. Serv., Mich. State College, East Lansing, Mich., Ext. Fldr. F-174, K. Lawton.

"Soil Survey of Limestone County, Alabama," Agr. Exp. Sta., Ala. Polytechnic Inst., Auburn, Ala., Series 1941, No. 5, Issued March 1953.

"Soil Survey of Noble County, Indiana," Agr. Exp. Sta., Purdue Univ., LaFayette, Ind., Series 1940, No. 8, April 1953.

"Soil Survey of Central Montana," Agr. Exp. Sta., Montana State College, Bozeman, Montana, Series 1940, No. 9, February 1953.

Crops

"Alaskland Red Clover," Agr. Exp. Sta., Univ. of Alaska, Palmer, Alaska, Cir. 20, Feb. 1953, H. J. Hodgson, W. B. Wilder, and J. E. Osguthorpe.

"Dairy and Potato Farms in the Matanuska and Tanana Valleys, 1951," Agr. Exp. Sta., Univ. of Alaska, Palmer, Alaska, Mim. Cir. 3, Feb. 1953, R. A. Andrews, H. A. Johnson, and P. F. Martin.

"Burmosa and Redheart—Two New Plum Varieties," Agr. Exp. Sta., Univ. of Calif., Berkeley 4, Calif., Bul. 735, C. O. Hesse.

"Peach Varieties for a Warm Winter Climate," Agr. Exp. Sta., Univ. of Calif., Berkeley 4, Calif., Cir. 406, J. W. Lesley and M. M. Winslow.

"Brussels Sprouts Production in California," Agr. Exp. Sta., Univ. of Calif., Berkeley 4, Calif., Cir. 427, R. H. Sciaroni, P. A. Minges, W. H. Lange, and W. C. Snyder.

"Progress Report 1940-1951, Dominion Experimental Station, Prince George," Prince George, B. C., Canada, April 1953.

"Progress Report 1946-1951, Dominion Experimental Station, Ste-Anne-De-La-Pocatiere," Ste-Anne-De-La-Pocatiere, Quebec, Canada, March 1953.

"Legume-Grass Seedings," Agr. Ext. Serv., Univ. of Conn., Storrs, Conn., Bul. 442, Feb. 1953, R. I. Munsell.

"Chemical Investigations of the Tobacco Plant—The Effect of Curing and of Fermentation on the Composition of the Leaves," Agr. Exp. Sta., New Haven, Conn., Bul. 569, March 1953, H. B. Vickery and A. N. Meiss.

"Vegetable Varieties for Colorado," Agr. Ext. Serv., Colo. A & M College, Ft. Collins, Colo., Cir. 174-A, May 1952, C. M. Drage and A. C. Ferguson.

"1952 Report Florida Agricultural Extension Service," Univ. of Fla., Gainesville, Fla., H. G. Clayton, M. O. Watkins, and F. W. Parvin.

"Miscellaneous Tropical and Sub-Tropical Florida Fruits," Agr. Ext. Serv., Univ. of Fla., Gainesville, Fla., Bul. 156, April 1953, H. Mowry, L. R. Toy, and H. S. Wolfe.

"Serving Georgia Through Research—1952 Annual Report," Agr. Exp. Sta., Univ. of Ga., Athens, Ga.

"Temporary Winter Grazing Practices," Agr. Exp. Sta., Univ. of Ga., Athens, Ga., Bul. 276, Jan. 1953, L. V. Crowder, O. E. Sell, and E. M. Parker.

"1950-1952 Hawaii Agricultural Experiment Station Biennial Report" Agr. Exp. Sta., Univ. of Hawaii, Honolulu 14, Hawaii, Feb. 1953, L. A. Henke.

"Molasses Grass on Hawaiian Ranges," Agr. Ext. Serv., Univ. of Hawaii, Honolulu, Hawaii, Ext. Bul. 59, June 1953, E. Y. Hosaka and J. C. Ripperton.

"Groff—A New Variety of Lychee," Agr. Exp. Sta., Univ. of Hawaii, Honolulu, Hawaii, Cir. 39, April 1953, W. B. Storey, R. A. Hamilton, and H. Y. Nakasone.

"Overland Oats," Agr. Exp. Sta., Univ. of Idaho, Moscow, Idaho, Cir. 126, March 1953, H. Stevens.

"Illinois Orchard Topics," Agr. Ext. Serv., Univ. of Ill., Urbana, Ill., H510a, April 1953, J. C. McDaniel.

"Ornamental Evergreens—Their Planting and Care," Agr. Ext. Serv., Purdue Univ., LaFayette, Ind., Ext. Bul. 320, R. B. Hull.

"1952 Iowa Corn Yield Test," Agr. Exp. Sta., Iowa State College, Ames, Iowa, Bul. P115, Feb. 1953, C. D. Hutchcroft and J. L. Robinson.

"Sixteenth Biennial Report of the Director for the Biennium July 1, 1950, to June 30, 1952," Agr. Exp. Sta., Kansas State College, Manhattan, Kansas.

"Alfalfa Seed Production in Kansas," Agr. Exp. Sta., Kansas State College, Manhattan, Kansas, Cir. 290, Nov. 1952, C. O. Grandfield and W. W. Franklin.

"Grow Snap Beans," Agr. Ext. Serv., La. State Univ., Baton Rouge, La., Agr. Ext. Pub. 1128, Oct. 1952, J. A. Cox and J. Montelaro.

"Louisiana Cotton," Agr. Ext. Serv., La. State Univ., Baton Rouge, La., Ext. Pub. 1132, Nov. 1952, R. A. Wasson and I. W. Carson.

"Christmas Harvest," Agr. Ext. Serv., Univ. of Maine, Orono, Maine, Ext. Bul. 430, May 1953, L. P. Bissell.

"Research the Key to Agricultural Progress," 65th Ann. Rpt., Agr. Exp. Sta., Univ. of Md., College Park, Md., Bul. A-74, Nov. 1952.

"Hints on Strawberry Growing in Home Gardens," Coop. Ext. Serv., Mich. State College, East Lansing, Mich., Ext. Fldr. F-176, June 1953.

"Varietal Trials of Farm Crops," Agr. Exp. Sta., Univ. of Minn., St. Paul 1, Minn., Misc. Rpt. 18, June 1953.

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Planting for Dry Spells . . .

(*From page* 16)

under most conditions, but that time of planting is extremely important for success with these crops; and that pastures managed in such a way as to guard against overgrazing while utilizing excess growth for hay to use in emergency periods will pay good dividends.

Efficiency May Mean Less Production Now

Farm efficiency may mean less production instead of more, says Mervin G. Smith, Extension Specialist at Ohio State University.

Smith says many farmers have the mistaken idea that efficiency means to produce more crop and livestock products—which would aggravate the present temporary surplus problem. This is not so.

"Efficiency means getting the most from each unit—from each acre, each cow, sow, ewe, or hen," Smith says.

"If a farmer can get as much from an acre and a half as he has been getting from two acres, isn't it better for him to farm the acre and a half?" he asks. He points out that the other half acre could go into a soil-building program. This would reduce labor while building soil for future production.

"We need increased production to support a growing population if we

take the long range view," the Economist adds. "This may mean cutting production and building soil now when we seem to have plenty of food and feed to meet current demands.

"We certainly need efficiency now —as much as or more than ever before. We need a bushel of feed from the same acre and for the same cost that have been producing less than a bushel. This will reduce labor and equipment costs and increase net income."

Lobsters Help Solve Problem

LOBSTERS are helping solve a problem that has puzzled scientists for generations—what happens to dead insect skeletons in the soil.

Donald M. Reynolds, Assistant Professor of Bacteriology on the Davis campus of the University of California, is trying to find out how chitin, the outer shell of lobsters and insects, is broken down in the soil. Chitin also makes up the skeletons of certain other animals and the walls of most fungi.

This hard, plastic-like material does not dissolve in water or most solvents, except some strong acids. But strong acids are not found in soils. Yet, all the insect bodies and fungi are decomposed in the soil, as are skeletons of lobsters, shrimp, and other similar animals in the oceans. Without this natural decomposition in the soil, we would be more than knee-deep in dead insect bodies.

Reynolds is working with soil microbes that feed on chitin by secreting enzymes that break down the chitin into other compounds. He is also studying the enzymes and attempting to identify the breakdown products. The work is being carried on partly under a grant from the National Science Foundation.

Fertilizing Peat Soils

NITROGEN fertilizer, even on peat soils, often boosts individual celery plant weights as much as a pound.

Vegetable Crop Specialists at the University of California at Davis ran tests for four years on San Joaquin Delta soils to find out how much nitrogen, phosphorus, and potash are needed to produce the heaviest crop.

Even though organic peat soils are generally high in nitrogen, the rate of breakdown of organic matter and release of nitrogen are normally too slow to supply all the needs of a high nitrogen-using crop like celery.

Optimum fertilization also speeds up the growth of the crop so the celery can be harvested as much as a month earlier in some cases, according to J. P. Underhill, U. C. Farm Adviser at Stockton, Oscar A. Lorenz and Melvin P. Zobel, Department of Vegetable Crops at Davis.

The researchers suggest a complete fertilizer supplying 100 to 200 pounds of nitrogen per acre and 100 pounds each of phosphoric acid and potash per acre for maximum yields on peat land

where preceding crops have not been heavily fertilized.

On land definitely known to be deficient in any of these materials, 200 pounds of nitrogen, phosphorus, or potash per acre are recommended.

Split applications of the fertilizers showed little difference in yields over a single application immediately after transplanting.

Feed Tomatoes Well For Highest Yields

FOR high yields, feed tomatoes well is the advice of vegetable crops specialists at the Experiment Station at Geneva.

A 10-ton to the acre crop, or about 375 bushels, not a particularly heavy yield of tomatoes for New York State, removes 100 pounds of nitrogen, 35 pounds of phosphorus, and 175 pounds of potash in the fruit alone, according to Professor Charles B. Sayre. And yields of 20 tons of marketable tomatoes to the acre are frequently obtained, he adds.

While the amount of phosphorus removed by the tomato crop is relatively small, at least four times that amount should be used because of the rapid "fixation" of phosphorus in unavailable forms in the soil, explains Professor Sayre.

"On the other hand," he continues, "if large amounts of fertilizer high in phosphorus have been applied to the field for a number of years, the fixing capacity of the soil will become partially saturated and a lower phosphorus ratio will give as good crop yields with less cost. In such cases an 8-16-16 or 5-10-10 fertilizer is recommended at the rate of 600 to 800 pounds per acre."

About three-fourths of the fertilizer should be broadcast and plowed under as the land is fitted for tomatoes with the remaining one-fourth applied at planting time. Additional nitrogen may also be applied to good advantage as a sidedressing at the last cultivation of the crop.

Organic Gardening Hobby Has Limits On Farming Scale

ORGANIC gardening may be all right as a backyard hobby but farmers find it has limitations in large-scale operations, says the Ohio Farm and Home Research magazine.

Myron A. Bachtell, Agronomist at the Ohio Agricultural Experiment Station and author of the article, says the home gardener may have ample organic materials such as leaves, grass clippings, straw, and weeds to spread on his small plot of soil. A farmer, however, can not find enough of such materials to supply all the needs of his large acreage. Bachtell backs up his statements by citing results of long-time tests at the Ohio Agricultural Experiment Station. Research included crops such as corn, oats, and wheat grown in rotation and continuously.

Without a sod crop, organic matter content of soil decreased—even though more manure was used than the crops could make themselves. Bachtell

learned that even in crop rotations, organic matter was lacking in sufficient quantities to produce yields comparable to plots receiving additional inorganic fertilizer.

Another point that agronomists question, states the magazine, is that organic farmers insist on using raw rock sources of phosphorus and potassium. Thousands of farmers have learned that they get better results more quickly from superphosphate and muriate of potash.

The Agronomist points to a half century of research at the Ohio Experiment Station which supports the viewpoint of farmers who put their trust in superphosphate and muriate of potash.

A farmer will get his most desirable results, Bachtell declares, when he practices a soil management plan that includes commercial fertilizer, manure, and sensible crop rotation.

Recent Trials With Rescue Grass . . .

(*From page* 22)

ably resistant to mildew. Many growers in the Southeast have reported failures with plantings made with seed grown in drier climates due to these diseases, but the Chapel Hill plantings have done well. Seed treatment checks head smut, but strains subject to mildew should be avoided. In the Southeast, preliminary Experiment Station tests of strains of rescue grass indicate considerable variation in disease resistance, with but little difference in yield of the healthier strains. The Chapel Hill is one of the healthier strains, and its seed is now available in quantity.

Very little is known as yet about the various rescue-legume combinations that may prove successful. We have had fair success with rescue over the past four years when it was oversown on kudzu pastures. Considerable winter grass grazing has been secured on the dormant kudzu in winter, but the extra trampling by cattle on the poor, thin, eroded land of the type generally set to kudzu, together with some competition effects of the grass appears to be reducing the vigor of the kudzu summer growth that is needed for emergency summer and fall grazing. Consequently we are placing more emphasis on the culture of rescue grass on better cropland where we can fence and graze it as needs require, harvest seed, disc down the stubble, and grow a catch crop; or winter graze then turn the sod under in adapted rotations, meanwhile maintaining good soil and water conservation practices that improve our soils.

Rothamsted Revisited . . .

(*From page* 12)

and the first experimental manures were applied. These dressings were repeated year by year and the produce was cut for hay twice a year. This exhaustive treatment, continued for so many years, has no direct relation to normal farm practice but has yielded dramatic results. An early effect was marked deterioration in quality of herbage due to increasing acidity of the soil receiving annual dressings of ammonium sulphate. Accordingly in 1903, most of

the plots were divided and the southern halves were limed, this treatment being repeated every fourth year. A marked change in the herbage is now evident where residual acidity has been counteracted in this way. On the other hand where nitrogen was applied as nitrate of soda, no residual acidity developed and adding lime has had little visible effect. Both ammonium sulphate and nitrate of soda promote early growth and increase growth of grass at the expense of the clovers. Because the grass is cut as hay instead of being mowed in the early stages of growth or grazed, it tends to shade out the clovers and in consequence the clovers are not able to benefit from dressings of superphosphate as they do in more normal conditions. Applications of potassium now have striking effects on the composition of the herbage because taking hay off the land year after year has lowered the level of potassium in subplots receiving no addition of this element.

The changes in composition of the herbage have been followed by laborious and costly botanical analysis. (Recent data will be found in the Rothamsted Experimental Station report: Results of the Field Experiments 1939-1947, Vol. 1, now in the press.) Increasing soil acidity initiated by some of the experimental treatments has been followed by decrease in the numbers of earthworms. Because earthworms do not thrive in the most acid plots, the dead grass there assumes a peaty character. Moles which feed on earthworms are more active in the less acid plots. On the other hand, rabbits graze by preference on the grass of the most acid plots and stop short at the edge of the subplot that has received lime. Yields of hay in the Park Grass experiment range from 3 tons per acre for complete fertilizer to ½ ton per acre for control, that is, well above and well below usual farm yields in England.

The other classical experiments are Hoosfield: 5½ acres continuous barley since 1852; Hoosfield one-acre alternate wheat and fallow since 1851; Barnfield 8 acres continuous mangolds since 1876; and the Agdell Fields 3 acres for grass rotation since 1848. Descriptions of these experiments will be found in the "Guide to the Experimental Plots" (2).

The acreage permanently under classical and modern, long-period experiments is arable, 61½ acres and grass 7 acres. The classical and long-term experiments occupy the same sites every year and total 1,112 plots. Annual experiments which number 500 to 600 plots occupy different plots each year. Certain conditions are made and complied with in the intervals between experiments to reduce residual effects.

Older agricultural workers will remember some 25 years or more ago when the statistical concept and the necessity for the analysis of experimental data derived from experimental plots were strongly emphasized. The work of Dr. R. A., now Sir Ronald, Fisher, in this field is, of course, well-known. "Student's method," "standard error," "variance," and other terms became a part of the every-day vocabulary of the workers with fertilizer plots. Dr. F. Yates, F.R.S., now heads the statistical work at Rothamsted. As would be expected in the intervening years, the fertilizer experimental plots at Rothamsted have become more complicated than the simple plan of the classical experiments. The object of the new plans is, of course, to eliminate as much as possible the error due to differences in soil types and from other causes. Various designs of experiments are now used for modern work. All fertilizer treatments are replicated. One type of arrangement is randomized blocks; another is the Latin Square; and other experiments are laid out to employ a factorial design. For information on experimental design a practical summary will be found in "Guide to the Experimental Plots" (2), pages 24 and 25, and in more detail in "The Design of Experiments" (5), and "The Design and Analysis of Factorial Experiments" (6). The long-term ex-

periments are fully described in the above guide (2).

The old Park Grass plots are, as already stated, grown entirely for hay production and never ploughed up. The main pasture experiments of the Station are now concerned with soil fertility problems more closely connected with present-day practice—namely, the effect of leys or meadows of different kinds on the productivity of the soil when the land is once more brought under arable cropping. This study of ley farming or alternate husbandry involves the largest and most complicated rotation experiments now being conducted at Rothamsted and Woburn.

The results of fertilizer experiments on the "Exhaustion Land," Hoosfield, are very striking. A strip of 2½ acres grew wheat under different fertilizer treatments from 1852 to 1875. Then from 1876 to 1901, the strips were devoted to continuous potato experiments. The fertilizer treatments were then stopped except for an application of nitrogen every year. For 49 years no mineral fertilizers have been applied. It is noticeable that the crop of barley now grown is often quite uneven. The unevenness of this crop of cereals 49 years after the fertilization of potatoes ceased is associated with the residual effects from the use of barnyard manure and superphosphate. So striking was this result in 1949 that "chemical work on the crops and soils has been put in hand and cereal yields on the old plots are now taken" (2).

In addition to the field experiments, a vast amount of research and investigations is carried on in the several laboratories. They include departments in chemistry, biochemistry, physics, botany, soil microbiology, pedology with which is associated the soil survey of England and Wales, statistics, plant pathology, entomology, insecticides and fungicides, nematology and bees. There is also a field experiments section, the library containing 30,000 volumes, and a photographic section which is fully equipped. Photography plays an important role at Rothamsted.

It is impossible in the space available to give even a summary of the investigations in all the laboratories. Fortunately, however, an account of the work in progress, contributed by the heads of the departments and written in non-technical language, is available. It gives the general scope and results of the investigations (3). More complete details and review articles covering each section of the work will be found in the annual reports (4).

Some of the work of the chemistry department is closely linked with the series of field experiments on soils at Rothamsted, Woburn, and many other centers. The purpose is to correlate field results and data with laboratory investigations.

During the past seven years the chemistry department in close cooperation with the research branch of the forestry commission has carried out experiments in forest nurseries on sitka spruce and other conifers. Forest nurseries offer particularly good facilities for investigating soil fertility and crop nutrition problems, as the level of fertility in many nurseries is far below that common on farms, gardens, and orchards. Experiments in many nurseries over several seasons have failed to reveal any consistent differences between seedlings raised with composts and those raised with fertilizers provided adequate amounts of nitrogen, phosphorus, potassium, and in some instances magnesium, are given.

Conifer seedlings have often been observed to grow very poorly in the older "established" nurseries. "Partial sterilization" of these soils with formalin has given excellent results, but some improvement has also been obtained from acidifying the soils with flowers of sulphur or ammonium sulphate.

With this wealth of data and opportunities for research, it is no wonder that scientific workers from all over the world visit Rothamsted every year and stay for varying lengths of time, doing

work in its fields and laboratories. The countries represented by such visits in 1951 were Australia, British West Indies, Canada, East Africa (Kenya), Egypt, Denmark, France, Holland, India, Malaya, South Africa, South America, Spain, Sweden, Switzerland, Tasmania, United States, West Africa (Nigeria), and other parts of the British Isles.

Visitors are always welcome. As suggested in the guide, visitors are requested to make the necessary arrangements with the secretary before visiting the Experiment Station.

It is considered very desirable at Rothamsted for all members of the staff to have an over-all knowledge of work of the Station as a whole. To accomplish this purpose, it helps a lot to discuss matters over a cup of tea together. The staff have tea every afternoon at "Red Gables" and visitors from overseas are usually present also.

It is one of the best spots I know to raise our sights and obtain a glimpse of what is going on in the fields of soils, fertilizers, and plant diseases, not only in the United Kingdom but in many countries around the world.

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NOTE: Foreign postage is extra in all cases.

Potash Pays With Peanuts . . .

(*From page* 8)

ers plant in rows as narrow as their equipment will permit but not any closer than 24 inches. The crop must be kept clean. Peanuts cannot compete with grass when plants are small.

The crop also likes land plaster and this is dusted over the plants at the first sign of blooming. This material is a source of quickly available calcium and calcium helps to produce plump kernels. Land plaster does not correct an acid soil. Lime does that; but, land plaster put on the ground where the young peanuts are forming is really effective. It makes the kind of peanuts that sell well on the market and taste well at the ball game.

Dusting the growing crop with sulphur also pays in that the sulphur dust controls leafspot, prevents shedding of the ripe nuts at digging time, and increases the quality and total yield of hay. The sulphur or copper-sulphur dust is made in three applications. When a crop is dusted, it should not be dug as early as an undusted crop.

This is not intended to be a full treatise on how to grow peanuts. Rather it is given to tell how one man is gradually increasing his acre yield on his farm and how one whole county is uniting to do the same thing on the farms of all growers in that county. The story could be duplicated in all the peanut-growing counties of North Carolina. It is having an effect on a crop worth $33,517,000 as picked and threshed in the State in 1952.

Little Things . . .

(*From page* 5)

events that youthful eyes see with amazement. My own Mother told me many yarns of the early times along the winding river where she spent her girlhood. Especially did she stress the little frame house by the ferry operated by my Grandpa back in the pioneer times. Later when I owned a car, it was a privilege to load Mother aboard and travel down the dusty roads and over the long, covered wooden bridge to the land of her dreams.

At our first visit to the old habitat Mother had a hard time finding the exact spot because of new roads and relocations. A bystander with local lore showed us what was left of the old ferry house—now used as a shelter for chickens. Mother may have been disappointed somewhat as she peered in, but she found a path around the outside that led to a blooming lilac bush, planted by her Mother in the 1850's. "It looks awful small to me," she said of the house. "But it's always going to seem big to me as long as I live."

Remembering that, my own wife and I often took the kids out to the place and reminded them that the scenes we cherish in our infancy and youth are always bright landmarks if the living done in them was happy and worth recalling. Later we found that this was time well spent, for the children often mention things about our own home place which we had almost forgotten in the rush of breadwinning.

Out on the Dakota prairies years ago I heard a rugged settler tell how he used to go to the country store with his uncle. He told how the goods displayed in various ways made such an impression on him, and how vast the emporium seemed as he walked down the aisles holding fast to his uncle's hand. When the bill of the month was paid in cash, the merchant lifted out some stick candy from a covered jar and handed the boy a striped bagful of the treat. Neither the storekeeper nor the uncle probably ever knew that the boy would find that scene recurring many times in after years when stores were much larger and little things forgotten.

Right there is where so many of us older people miss a chance to make their day and age a delight forever. When we refuse to clasp a little hand, or act too tired to join a childish play, or find some excuse to be elsewhere when the here and the now is the moment that fashions memories—we are the ones who miss the boat. To live well and play fair is a great goal. But to do little things for which we will long be remembered, that's the best of all.

Plant physiologists and geneticists over and over again deal with the tiny elements of life and are familiar with the wonders that spring from little and delicate things—often ignored and despised by those who do not really know what a universe we dwell in.

One branch of one tree in a grove where thousands grew near Manavista, Florida, bore pink grapefruit back in 1907. A few years later a bud sport was found on a seedless tree. Its fruit was both pink and seedless. Few can tell, they say, just how the Temple orange variety originated, except that the bud wood responsible for this sport was first brought into Florida from Jamaica. What actually happened is not clear, but some claim it is a natural cross between a sour orange and a tangerine.

A Chinese cling peach in a tree in Georgia produced two seeds that made history. One seed produced the famous Elberta, a lush fall variety. The other one produced Belle of Georgia, a white peach of rare flavor and aroma. The seed of a wild grape at Concord, Massachusetts, in 1849 bore a seedling grape that was named Concord. In a year its growth had spread to all parts of the vineyard country.

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Thus without much human participation by direct hybridization these and similar manifestations of nature often prove that what we call mere chance and accident causes the development of popular and profitable fruits—from small and unplanned beginnings. The same is often true of some of our cereals. The operator of any practical enterprise may not wish to trust to chance for his ultimate success. But often things intervene that in themselves seem insignificant and worthless. So the wise man avails himself of these unusual gifts from nature and learns that the old Scotch proverb is true—"monny a mickle maks a muckle."

Sometimes the possession of just a little of the happiness mankind may find in this world is conducive of more inspiration and inward glow than a surfeit of bountiful pleasures and privileges.

Sometimes a small amount of travel beyond the confines of home localities gives one a greater lift and more permanent satisfaction than one might enjoy if he had a universal complimentary pass on the steamships and the railways of the world.

I have talked with a simple and lovely old lady of our hill country whose only solace at the end of a long day was to smoke her clay pipe and watch the sunset tinge the flower borders she had planted. I have observed hard-pressed mothers inventing new games and pastimes for the children during the stress of a hard farm day of meal preparation, dish washing, and ironing—always cheery and responsive to the urgent demands of their broods. They stopped to do little things for little ones amid the cares and burdens of adult life, regardless of pain or worry.

I have seen a man suffering with an incurable malady who regularly assumed his small duties at breadwinning and home-providing without any outward sign that he was sorry for himself or wanted sympathy and special consideration. All of us know others

who follow the routine of obligations and carry responsibilities to the last detail under the most distracting and disturbing conditions of life. They know that keeping busy at everyday tasks and duties casts a sense of assurance and welfare among those around them who lean on the "head of the house" for confidence and courage.

This is in sharp contrast with too many of us who make mountains out of anthills and fret ourselves into pessimism and gloom over what are either nonessential things or circumstances beyond our control. To be serene may be a little thing as things go, but it is a joy forever for those who come within its orbit.

I know some persons blessed with a sense of humor and philosophy so they are never at a loss to find things of purpose to perform even when life has lost its youthful energy and keen ambition for tomorrow's goals.

They make light of their perplexities and continue to do the little chores that keep their community a going concern. To a person who has thought of himself as a specialist or a career winner on some public project, the time of retirement often baffles and uproots his self-assurance. He is not willing to see that perhaps by doing some of the little, ordinary, commonplace jobs around him he will be getting a better grip on himself than he would if he insisted on remaining in his usual niche to the last.

Your Bible speaks little of huge projects and powerful personal ambitions. Its pages are a constant record of little things which restore the soul and simple ways to reach out toward truth, happiness, and immortality. The best and most helpful books by our authors and historians are not the ones that show us how to be a material success and acquire fame and riches. Our fondest memories are always of books that treat of home and friends and work well done and kindly attention to all the little things—the things that live forever and need no bank vaults or marble columns to prove their value to the world.

Left—untreated onion; Right—treated with MH-40

Naugatuck nips storage growth in bud!

Naugatuck Chemical has good reason to believe it has dealt a death blow to destructive storage growth of crops such as onions. The reason is a unique new chemical—a water-soluble salt containing 40% maleic hydrazide and called MH-40.*

Since its discovery in 1947, Naugatuck's research scientists, working in cooperation with more than 250 experiment stations and other agriculturists, have found hundreds of potential uses for MH-40. One development was for the inhibition of storage growth, so growers need no longer fear its sprouting and shriveling effect on crops.

Today MH-40 is commercially available as a grass inhibitor and wild-onion killer. Soon it will be made available as a storage growth inhibitor, too! *U. S. Pat. No. 2,614,916

MH-40 is one more example of Naugatuck know-how at work, always striving to introduce new and better products to the agricultural field.

UNITED STATES RUBBER COMPANY

Naugatuck Chemical Division, Naugatuck, Conn.

producers of seed protectants, fungicides, miticides, insecticides, growth retardants, herbicides; Spergon, Phygon, Aramite, Synklor, MH, Alanap.

FREE LOAN OF EDUCATIONAL FILMS

The American Potash Institute will be pleased to loan to educational organizations, agricultural advisory groups, responsible farm associations, and members of the fertilizer trade the motion pictures listed below. This service is free except for shipping charges.

FILMS (ALL 16 MM. AND IN COLOR)

The Plant Speaks Thru Deficiency Symptoms (Sound, running time 25 min. on 800-ft. reel.)

The Plant Speaks, Soil Tests Tell Us Why (Sound, running time 10 min. on 400-ft. reel.)

The Plant Speaks Thru Tissue Tests (Sound, running time 14 min. on 400-ft. reel.)

The Plant Speaks Thru Leaf Analysis (Sound, running time 18 min. on 800-ft. reel.)

Save That Soil (Sound, running time 28 min. on 1200-ft. reel.)

Borax From Desert to Farm (Sound, running time 25 min. on 1200-ft. reel.)

Potash Production in America (Sound, running time 25 min. on 800-ft. reel.)

In the Clover (Sound, running time 25 min. on 800-ft. reel.)

In Canada: The Plant Speaks Thru Deficiency Symptoms
The Plant Speaks, Soil Tests Tell Us Why
The Plant Speaks Thru Tissue Tests
The Plant Speaks Thru Leaf Analysis
Borax From Desert to Farm
Potash Production in America

DISTRIBUTORS

Northeast: Educational Film Library, Syracuse University, Syracuse 10, N. Y.

Southeast: Vocational Film Library, Department of Agricultural Education, North Carolina State College, Raleigh, North Carolina.

Lower Mississippi Valley and Southwest: Bureau of Film Service, Department of Educational Extension, Oklahoma A & M College, Stillwater, Oklahoma.

Midwest: Visual Aid Service, University Extension, University of Illinois, Champaign, Illinois.

West: Department of Visual Education, University of California, Berkeley 4, California.
Department of Visual Education, University of California Extension, 405 Hilgard Ave., Los Angeles 24, California.
Department of Visual Instruction, Oregon State College, Corvallis, Oregon.
Bureau of Visual Teaching, State College of Washington, Pullman, Washington.

Canada: Canadian Film Institute, 172 Wellington Street, Ottawa, Ontario.

For the Province of Ontario: Distribution Services, Ontario Agricultural College, Guelph, Ontario.

IMPORTANT

Requests should be made well in advance and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of loan.

Request bookings from your nearest distributor.

AVAILABLE LITERATURE

The following literature on the use of fertilizers in profitable soil and crop management is available for distribution. We shall be glad to send these upon request and in reasonable amounts as long as our supply lasts.

Reprints

28-12-45 Better Corn (Midwest) (Circular)
F-3-40 When Fertilizing, Consider Plant-food Content of Crops
S-5-40 What is the Matter with Your Soil?
Y-5-43 Value & Limitations of Methods of Diagnosing Plant Nutrient Needs
A-1-44 What's in That Fertilizer Bag?
QQ-12-44 Leaf Analysis—A Guide to Better Crops
P-3-45 Balanced Fertility in the Orchard
Z-5-45 Alfalfa—The Aristocrat
OO-8-45 Potash Fertilizers Are Needed on Many Midwestern Farms
ZZ-11-45 First Things First in Soil Fertility
T-4-46 Potash Losses on the Dairy Farm
Y-5-46 Learn Hunger Signs of Crops
I-2-47 Fertilizers and Human Health
T-4-47 Fertilizer Practices for Profitable Tobacco
AA-5-47 The Potassium Content of Farm Crops
TT-11-47 How Different Plant Nutrients Influence Plant Growth
VV-11-47 Are You Pasture Conscious?
R-4-48 Needs of the Corn Crop
X-6-48 Applying Fertilizers in Solution
AA-6-48 The Chemical Composition of Agricultural Potash Salts
GG-10-48 Starved Plants Show Their Hunger
OO-11-48 The Use of Soil Sampling Tubes
KK-10-49 An Approved Soybean Program for North Carolina
SS-12-49 Fertilizing Vegetable Crops
F-1-50 A Simplified Field Test for Determining Potassium in Plant Tissue
K-3-50 Metering Dry Fertilizers and Soil Amendments into Irrigation Systems
V-5-50 Potassium Cures Cherry Curl Leaf
X-5-50 Fertilizers Help Make Humus
BB-8-50 Trends in Soil Management of Peach Orchards
II-11-50 Tree Symptoms and Leaf Analysis Determine Potash Needs
I-2-51 Soil Treatment Improves Soybeans
X-8-51 Orchard Fertilization Ground and Foliage
BB-10-51 Healthy Plants Must Be Well Nourished
CC-10-51 Producing Small Grain More Efficiently
EE-10-51 Rotation Fertilization
GG-11-51 Fertilizer Recommendations Based on Soil Tests
II-12-51 Pasture Improvement With 10-10-10 Fertilizer
JJ-12-51 Soil Fertility and Pastures
KK-12-51 Potassium in Animal Nutrition
A-1-52 Research Points the Way to Higher Levels of Peanut Production
D-2-52 Boron for Forage Crops
E-2-52 Ladino Clover—Its Mineral Requirements & Chemical Composition
H-3-52 The Relative Merits of Inorganic & Organic Sources of Plant Nutrients
L-4-52 Efficient Use of Fertilizer in the Southern Region
O-4-52 Tomato Production for the Canning Industry
Q-5-52 Potassium-nitrogen Balance for High Corn Yields
R-5-52 Why Plants Differ in Fertilizer Need and Mineral Composition
T-8-52 Fertilizers Used in 1951 by New York Tomato Growers
V-8-52 Growing Better Turnips
X-10-52 The Mineral Uptake by the Sweet Potato
Y-10-52 The Nutrition of Muck Crops
CC-12-52 The Leaf Analysis Approach to Crop Nutrition
DD-12-52 Potash Deficiency of Reforested Pine and Spruce Stands in Northern New York
EE-12-52 Flue-cured Tobacco Fertilizers of the Future.
A-1-53—Phosphate and Potash Effects on Ladino Clover Swards
B-1-53—Commercial Fertilizer Is a Sound Investment
C-1-53—Wisconsin's Soil Bank Balances Are Running Low on Nitrogen and Potash
F-2-53—Grasses and Weeds—The Potash Robbers
H-2-53—The Diagnostic Approach in Corn Fertilizer Demonstrations in Minnesota
I-2-53—Sericea Is a Good Drought Crop
J-3-53—Balanced Nutrition Improves Winter Wheat Root Survival
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THE AMERICAN POTASH INSTITUTE

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We recently got word of the glib-tongued insurance agent who had just convinced a prospect to sign on the dotted line.

"Now that amounts to a premium of $6.90 per month on a straight life. That's what you wanted, wasn't it?

"Well," came the wistful reply, "I *would* like to fool around a little on Saturday nights . . ."

* * *

"Boys," said the pious teacher to his Sunday School class, "you must learn never to lose your tempers, even under the most vexing conditions. Now, to illustrate, while I have been standing here talking, a fly has landed on my nose. I do not swear. I do not blaspheme. I merely say, 'Go away fly.' MY GOD IT'S A BEE!"

* * *

A stout cedar shingle makes a pretty effective board of education.

* * *

"Now look here, fellow," the Army doctor snarled at the draftee, "you know very well you wouldn't come to me in civilian life with a little thing like this."

"You're darned right I wouldn't," drawled the recruit. "I'd send for you."

* * *

Latest model gas ranges include a venetian blind in the glass oven doors. This is for bashful girls who cook rump roasts.

"Is there any legend connected with that mountain?" the tourist asked of a native.

"Shore is," was the reply. "Two lovers went up that thar mounting and they never come back again."

"Mercy! What happened to them?"

"Went down t'other side."

* * *

A Texan walked into a New York night club, saw a customer lying helplessly on the floor, and pointing to him said:

"Give me a shot of that."

* * *

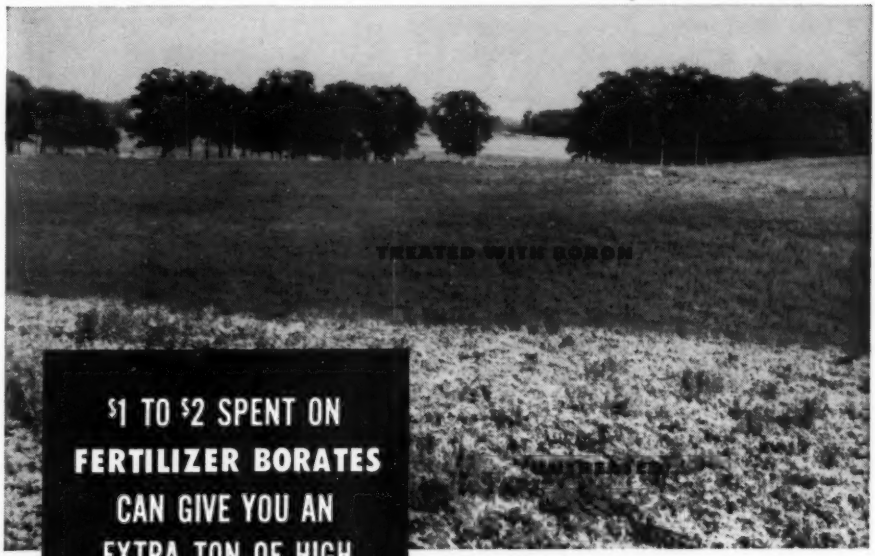
Some city folks who had moved to the countryside told a neighboring farmer they were going to raise ducks. When summertime came, the dirt farmer remarked one day to the city farmer, "I don't see any of those ducklings you were going to raise. What happened?"

"Well, now, I want to tell you about that," the city man explained. "We ordered a drake and some hens and they began to lay. When the hens took to settin', we let 'em set, but nothin' ever hatched. Finally, when the drake started settin'—we began to think something was wrong."

* * *

Some husbands are wonderful. Mike has been married for twelve years and has never stopped being romantic. Of course, if his wife ever finds out about it, she'll break his neck.

Want a Greater Alfalfa Yield per acre?



Borated Fertilizers pay 3 ways on Alfalfa

1. EXTRA YIELDS 2. BETTER QUALITY 3. LONGER LIFE STANDS

Yes, Boron means bigger crops of better quality! Alfalfa responds so readily to Boron that, in some cases, yield per acre is doubled. To put Boron back into the soil, use FERTILIZER BORATE—HIGH GRADE . . . it's the low-cost fertilizer borax, rich in Boron. (Contains approximately 121% borax equivalent).

FERTILIZER BORATE—HIGH GRADE, is an ore concentrate developed especially for fertilizer use. Because its water content is held to about 24% (5 mols) this material saves you money in costs of transportation, storage, handling, etc. Only 83 lbs of FERTILIZER BORATE HIGH GRADE is required for each 100 lbs. borax guaranteed in formulated mixtures. Available in two particle sizes; a fine mesh for adding to mixed fertilizers . . . a coarse mesh for direct application. County Agents or State Experimental Stations should be consulted for detailed recommendations.

Write today for literature and quotations on
Fertilizer Borate—The Low-Cost Fertilizer Borax

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